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Longitudinal Acceleration Test of Overhead Luggage Bins and Auxiliary Fuel Tank in a Transport Airplane Airframe Section, Part II

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Final Report

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This report provides additional data to report DOT/FAA/AR-99/4, Longitudinal Acceleration Tests of Overhead Luggage Bins and Auxiliary Fuel Tank in a Transport Airplane Airframe Section.

16. Abstract

This report contains the description and test results of overhead stowage bin calibrations and longitudinal impact testing of a 10-foot transport airframe section conducted at the Transportation Research Center Inc. (TRC). The purpose of the tests was to measure the structural responses and interaction between the fuselage, overhead stowage bins, and auxiliary fuel tank under simulated, potentially survivable, crash conditions.

A 10-foot section from a Boeing 737, Model 200 was used as the test section. The overhead stowage bin connection supports were instrumented with strain gages and calibrated. Two types of overhead storage bins were installed in the transport airframe and pulled in a longitudinal direction at various known loads to monitor and record the strain gage outputs.

The transport airframe was longitudinally impact tested using TRC's 24-inch shock tester. Peak accelerations and corresponding velocity changes of 6.1 g (23.2 ft/sec), 8.2 g (32.2 ft/sec), and 14.2 g (41.7 ft/sec) were recorded. The transport airframe section was configured with a 120-inch overhead stowage bin (Bin A) attached to the left/pilot side, a 60-inch overhead stowage bin (Bin B) attached to the right/copilot side, and a 500-gallon auxiliary fuel tank attached underneath the airframe's passenger floor section. The test articles were equipped with accelerometers, strain gages, and potentiometers totaling approximately 90 channels of data per simulated crash test.

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

EXECUTIVE SUMMARY

In November 1997 the Federal Aviation Administration (FAA) conducted three simulated longitudinal impact tests on a 10-foot section of a Boeing 737 fuselage at the Transportation Research Center Inc., located in East Liberty, Ohio.

The purpose of the tests was to measure the structural response of two overhead stowage bins and an auxiliary fuel tank that were mounted in the fuselage. The data collected during these tests are used to gain an understanding of the impact response characteristics of the structure and interior items (i.e., bins and fuel tank). The tests will also provide empirical data which can be used to develop new, or evaluate the adequacy of current, crash design standards for airframes and interior items.

The three tests were conducted at 6, 9, and 16 g's.

During the 6-g test a peak acceleration of 6.1 g's was reached with a velocity change of 23 ft/sec. As a result of this test the auxiliary fuel tank broke free of its mounting. No noticeable effect was seen on the overhead stowage bins. The fuel tank was removed for subsequent tests.

The 9-g test saw a peak acceleration of 8.2 g's with a velocity change of 32.2 ft/sec. No significant damage occurred to the overhead bins as a result of this test.

The 16-g test reached a peak acceleration of 14.2 g's with a velocity change of 41.7 ft/sec. One of the bins broke free of its support brackets as a result of this test. The other bin experienced no significant damage.

Additional data, photographs, and data plots for the bins, tank, and fuselage can be found in FAA report DOT/FAA/AR-99/4, Longitudinal Acceleration Test of Overhead Luggage Bins and Auxiliary Fuel Tank in a Transport Airframe Section.

INTRODUCTION

Three longitudinal simulated impact tests were conducted on a narrow-body transport (Boeing 737) fuselage section at the Transportation Research Center, Inc. (TRC). The tests were part of a series of tests conducted by the Federal Aviation Administration (FAA) in support of their Aircraft Safety Research Plan [1]. Additional tests in this series conducted by the FAA include the transport airplane controlled impact demonstration [2] which was equipped with instrumented overhead stowage bins [3]. Other longitudinal impact tests in this series include the test of a narrow-body fuselage with seats and test dummies [4], and a narrow-body fuselage with overhead stowage bins, auxiliary fuel tank, seats, and dummies [5]. Additional data, photographs, and data plots for the bins, tank, and fuselage can be found in FAA report DOT/FAA/AR-99/4, Longitudinal Acceleration Test of Overhead Luggage Bins and Auxiliary Fuel Tank in a Transport Airframe Section [6].

Prior to the three dynamic tests, a static or calibration test was conducted on each of the two overhead stowage bins. These tests were also conducted at TRC.

These tests are performed to gain understanding of the impact response characteristics of the structure and interior items. They also provide empirical data which can be used to develop new, or to evaluate the adequacy of the current, crash design standards for the airframe and interior items. These standards can be found in the Federal Aviation Regulations (FAR) Part 25.

TEST OBJECTIVES

The objective of these tests was to measure the interaction between the fuselage section and both the overhead stowage bins and the auxiliary fuel tank. Three tests were conducted at three different target g levels (6, 9, and 16 g's). The test results will be used to provide data that can assess current crash dynamic design standards or support future changes in the FARs.

In addition, a comparison will be made between the loads measured in the overhead stowage bins during the static test with the loads measured during the dynamic test. This information will be used to help determine the necessity for dynamic testing.

TEST ARTICLE

The test article used for all three tests was a 10-foot-long section of a Boeing 737-200, fuselage station (FS) 400 to 500A, and can be seen in figure 1. Mounted in the fuselage section were two overhead stowage bins and an auxiliary fuel tank. A detailed discussion of these items follows.

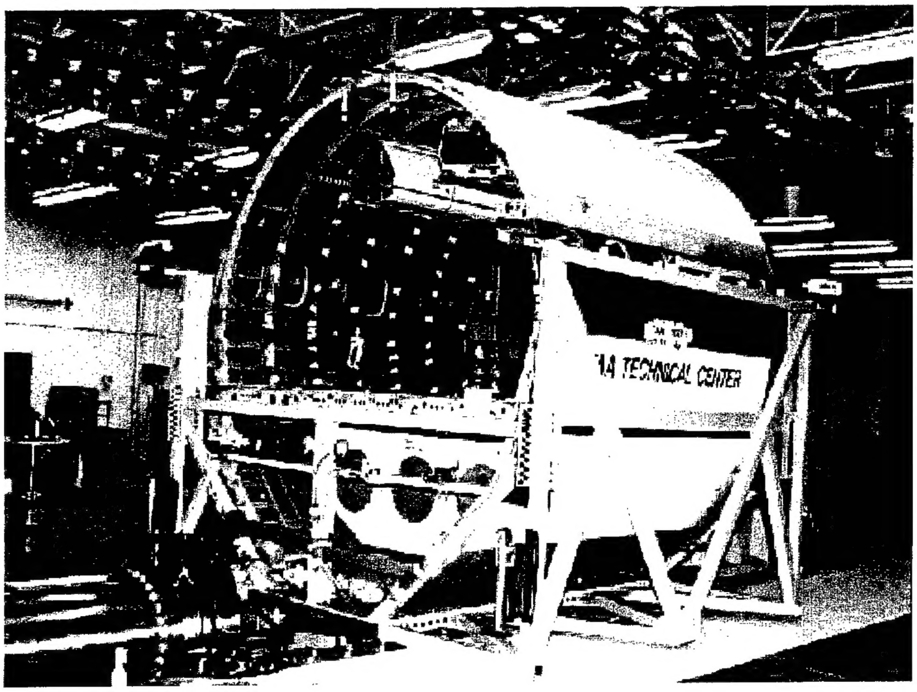


FIGURE 1. TEST ARTICLE

AUXILIARY FUEL TANK.

In the lower portion of the test article, a 500-gallon auxiliary fuel tank was mounted to the underside of the fuselage floor beams between FS 420 and FS 480. The fuel tank was mounted on two "hanger rails" running longitudinally along the bottom of the fuselage floor beams. The tank hangs on the rails by a "hanger flange" running longitudinally along the top sides of the tank. Longitudinal movement along the rails is prevented by a "keeper block" located at the four corners of the tank on the hanger rails. Figure 2 is a close view of the upper right corner of the fuel tank and shows the floor beam, hanger rail, keeper block, and fuel tank. Additional forward loads and moments are reacted by two bottom straps. The two bottom straps are fastened to the bottom of the fuel tank and to a section of the fuselage floor under the tank. The bottom strap can be seen in figure 3.

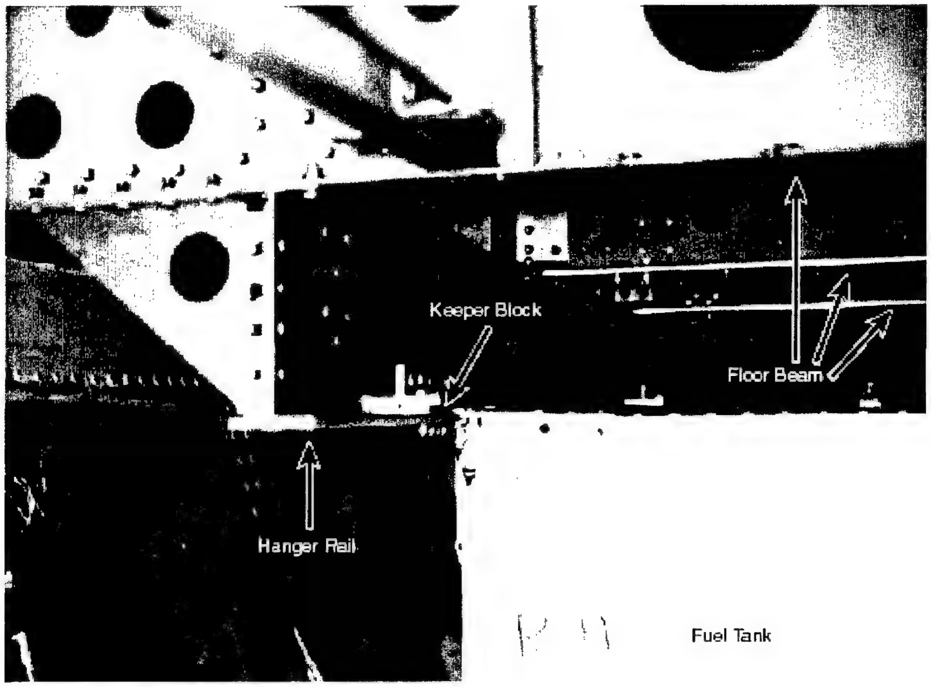


FIGURE 2. AUXILIARY FUEL TANK INSTALLATION

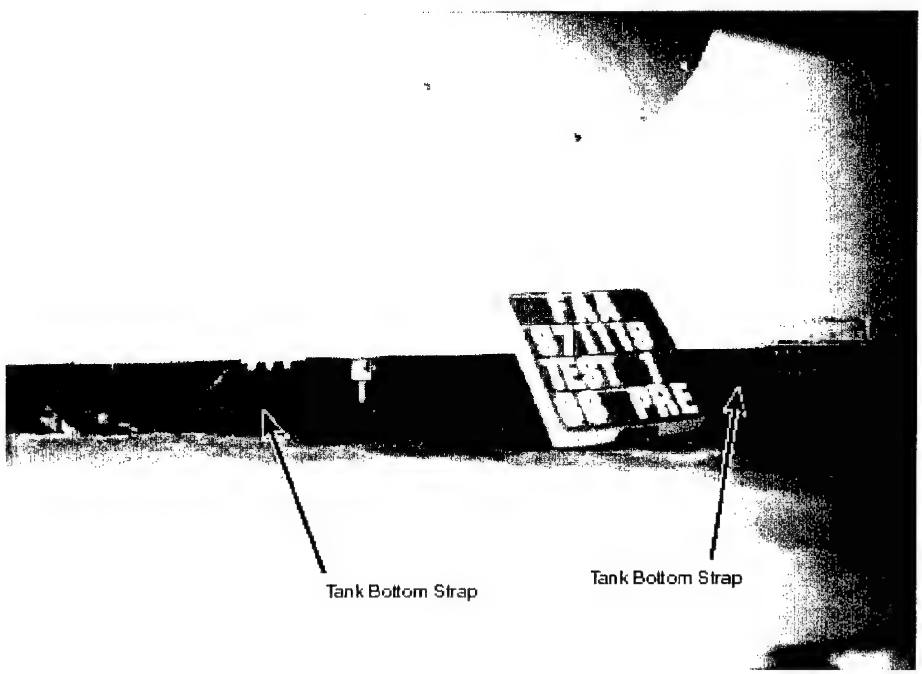


FIGURE 3. AUXILIARY FUEL TANK, BOTTOM STRAP

OVERHEAD STOWAGE BINS.

The test article contained two overhead stowage bins in the passenger cabin area. One of the stowage bins was 120 inches long and was mounted on the left/pilot side of the cabin between

FS 400 and FS 500A. This bin is referred to as bin A for this test. The other overhead stowage bin was 60 inches long and was mounted on the right/copilot side of the cabin between FS 420 and FS 480. This bin is referred to as bin B for this test. Photographs of bin A and bin B can be seen in figures 4 and 5 respectively.

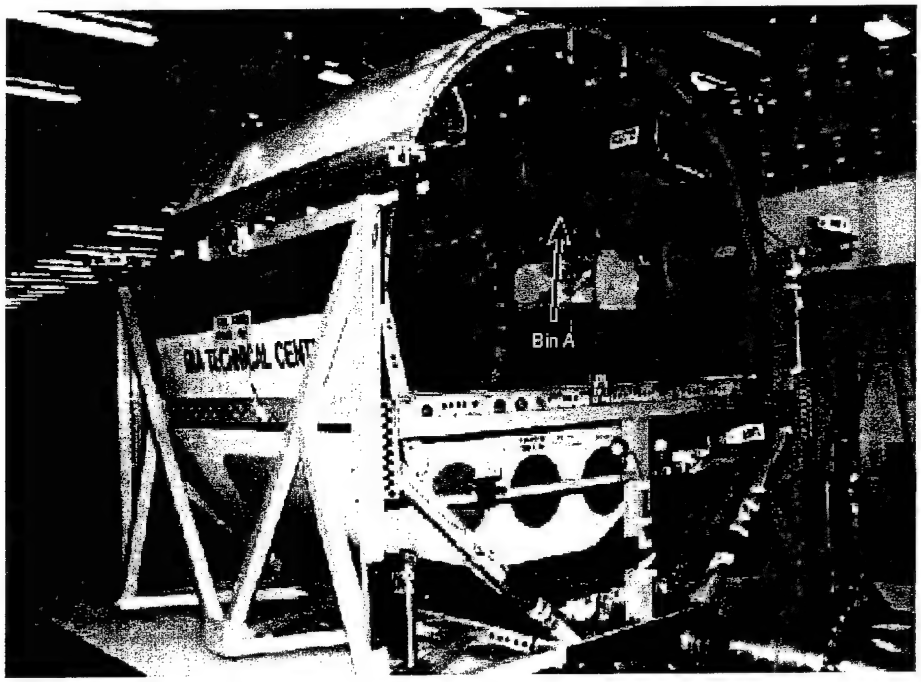


FIGURE 4. BIN A

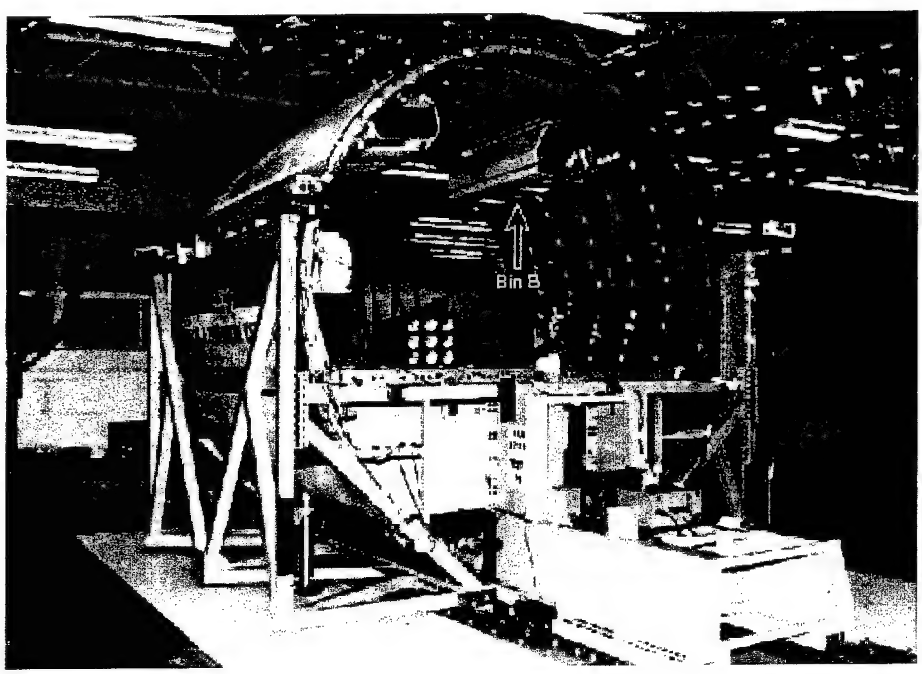


FIGURE 5. BIN B

Mounting and support brackets for the bins will be discussed in the calibration section of this report.

WEIGHT.

The test article weight during the first test was 13,584 pounds (this includes the 7180-pound sled to which the test article is mounted). A breakdown of the test article weight is provided in table 1.

TABLE 1. TEST ARTICLE WEIGHT

Item	Weight (pounds)
Test Article Empty Weight	2036
Sled Frame	7180
Overhead Stowage Bin A	92
Bin A Simulated Luggage	210
Overhead Stowage Bin B	53
Bin B Simulated Luggage	120
Auxiliary Fuel Tank	343
Simulated Fuel	3550
Total Weight	13,584

The auxiliary fuel tank and simulated fuel were not included on the second and third tests. All other weights remained the same. As a result of removing the fuel tank, the total test article weight was reduced by 3893 pounds to 9691 pounds for the second and third tests.

TEST FACILITY

The tests were conducted at the Transportation Research Center Inc.'s Impact Simulator Facility in East Liberty, Ohio. This facility uses a 24-inch-diameter HYGE Shock Tester to simulate the deceleration conditions of an impact by rapidly accelerating the test article in the opposite direction. In other words, the test article is initially at rest and the HYGE Shock Tester rapidly accelerates the test article backwards. This rapid backwards acceleration produces an impulse similar to that of a rapid deceleration which would be experienced by an identical vehicle in a forward impact.

The HYGE Shock Tester is pneumatically operated and produces thrust through differential gas pressures acting on the two faces of a thrust piston in a closed cylinder. Test article acceleration in controlled by a metering pin. The contour of the metering pin regulates the amount of gas flow from one side of the thrust piston to the other and thus allows control over the test article acceleration. By changing the pressures in the chambers of the cylinder the test article pulse magnitude and duration can be changed.

The test article was mounted in a steel frame and the steel frame was attached to the test facility sled. The steel frame was fabricated in a manner to minimize any effect on load paths between the fuselage and the overhead stowage bins, fuel tank, and fuselage floor.

INSTRUMENTATION

ELECTRONIC SENSORS.

The test article was instrumented with accelerometers, string potentiometers, and strain gages. Accelerometers were located on the fuselage, sled, overhead bins, and auxiliary fuel tank and were used to record acceleration in the longitudinal (X), lateral (Y), or vertical (Z) directions. String potentiometers were attached to the overhead stowage bins and the fuel tank and measured longitudinal displacement. Strain gages were attached to the support brackets of the overhead stowage bins and measured the loads on these support brackets.

Table 2 is a compilation of the instrumentation used in the three tests.

TABLE 2. INSTRUMENTATION

Test 1						
	Accelerometer			Strain Gage	String Potentiometer	Data Channels
	Longitudinal	Lateral	Vertical			
Fuselage	6	4	6	-	-	16
Floor	2	2	2	-	-	6
Overhead Stowage Bin A	3	3	3	-	1	10
Overhead Stowage Bin A Attachment Supports	-	-	-	21	-	21
Overhead Stowage Bin B	3	3	3	-	1	10
Overhead Stowage Bin B Attachment Supports	-	-	-	16	-	16
Auxiliary Fuel Tank	3	2	2	-	1	8
Drive Fixture/Sled	1	-	-	-	-	1
Total						87
Test 2 and Test 3						
	Accelerometer			Strain Gage	String Potentiometer	Data Channels
	Longitudinal	Lateral	Vertical			
Fuselage	6	4	6	-	-	16
Floor	2	2	2	-	-	6
Overhead Stowage Bin A	3	3	3	-	1	10
Overhead Stowage Bin A Attachment Supports	-	-	-	21	-	21
Overhead Stowage Bin B	3	3	3	-	1	10
Overhead Stowage Bin B Attachment Supports	-	-	-	16	-	16
Drive Fixture/Sled	1	-	-	-	-	1
Total						79

All data used for the analysis in this report can be found in appendix A.

FILM AND PHOTOGRAPHY.

Twelve high-speed cameras filming at 500 frames per second and two real-time video cameras were used during the first test to record the event. There were four high-speed cameras located on the floor of the test facility to film overall views of the tests. Eight high-speed cameras were located on the test sled or fuselage to capture isolated views of the bins and tank. The two video cameras were located on the test facility floor and also captured overall views of the test. Camera locations and views are shown in table 3.

TABLE 3. CAMERA VIEWS

Camera Number	Camera Location	Camera View	Type
1	Floor	Overall Front Right Quarter	High-Speed Film
2	Floor	Overall Front Left Quarter	High-Speed Film
3	Floor	Overall Rear Right Quarter	High-Speed Film
4	Floor	Overall Rear Left Quarter	High-Speed Film
5	Sled	Bin A Forward	High-Speed Film
6	Sled	Bin A Rear	High-Speed Film
7	Fuselage Floor	Bin A Upper Support	High-Speed Film
8	Sled	Bin B Forward	High-Speed Film
9	Sled	Bin B Rear	High-Speed Film
10	Fuselage Ceiling	Bin B Outboard Side Support	High-Speed Film
11	Sled	Fuel Tank	High-Speed Film
12	Sled	Fuel Tank	High-Speed Film
13	Floor	Overall Front Right	Video
14	Floor	Overall Front Left	Video

For tests two and three, cameras 11 and 12 were removed (these cameras were previously recording the fuel tank).

Pretest and posttest photographs were taken with a 35-mm camera for each test. Photographs were taken of any significant damage or points of interest.

CALIBRATION ANALYSIS

Prior to the three tests, calibrations were performed on the overhead stowage bins. These calibrations were conducted to verify the loads in the support brackets were within expected limits. Also, these calibrations are the basis for comparisons of the loads under static and dynamic conditions as well as determining the influence coefficients.

In order to conduct the calibration each bin was pulled in the longitudinal direction at a force equal to six times its weight and contents (i.e., a 6-g static test). Bin A weighing a total of 302 pounds was pulled to approximately 1812 pounds, and bin B weighing 173 pounds was pulled to approximately 1038 pounds. These loads were target weights that were not exactly achieved as noted below.

BIN A.

Bin A was held in place by six support brackets, three of these support brackets attached to the top of the bin and three attached to the bottom of the bin. The three upper support brackets attached to a support rail that ran longitudinally along the fuselage. The support rail was mounted to the fuselage frame sections. The lower support brackets attached to either an air duct that ran longitudinally along the fuselage or to the fuselage frame sections through a link/turnbuckle assembly.

For the purpose of identification during this test, the three upper and three lower support brackets were labeled AU75, AU76, AU78 and AL78, AL76, AL75 respectively. Locations for these supports can be seen in figure 6.

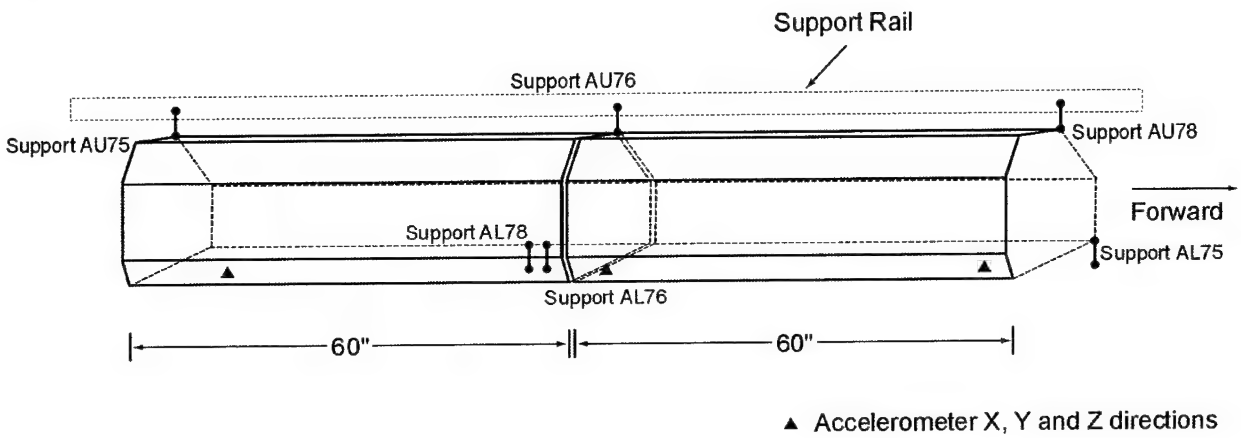


FIGURE 6. BIN A SUPPORT BRACKET LOCATIONS

To determine if all the forces on bin A were within expected limits and in equilibrium, a force balance was calculated using the load data of the support brackets collected during the static calibration test. Before this could be done, the loads recorded in each of the support brackets had to be resolved along the aircraft vertical and lateral axes. For the upper brackets there was a 57-degree offset between the vertical and lateral axis of the support bracket and the vertical and lateral aircraft axis ($\alpha = 57$ degrees). A diagram of the upper support bracket and related axis is shown in figure 7. The lower support brackets had a 16-degree offset between the vertical and lateral axis of the support bracket and the vertical and lateral aircraft axis ($\alpha = 16$ degrees) and is shown in figure 8.

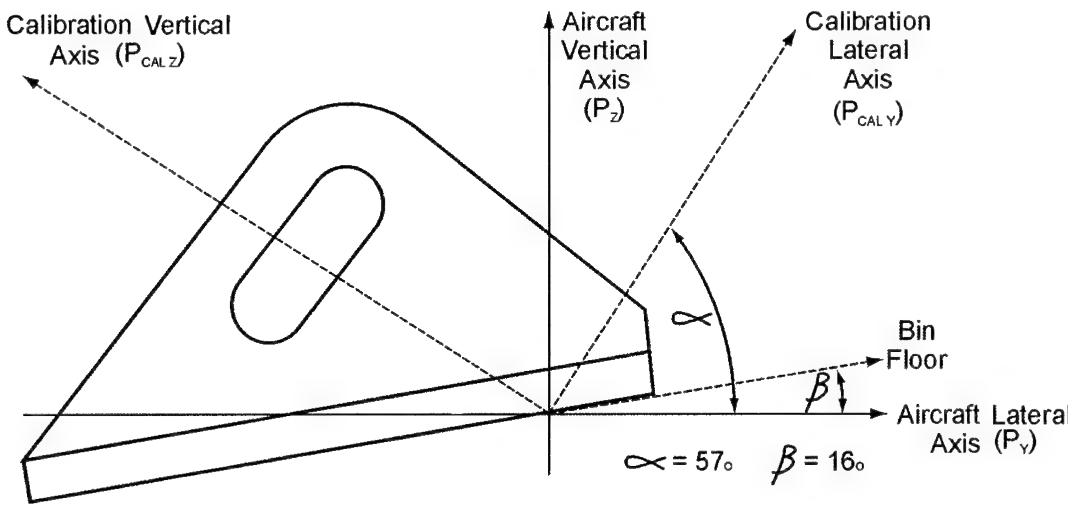


FIGURE 7. BIN A UPPER SUPPORT BRACKET

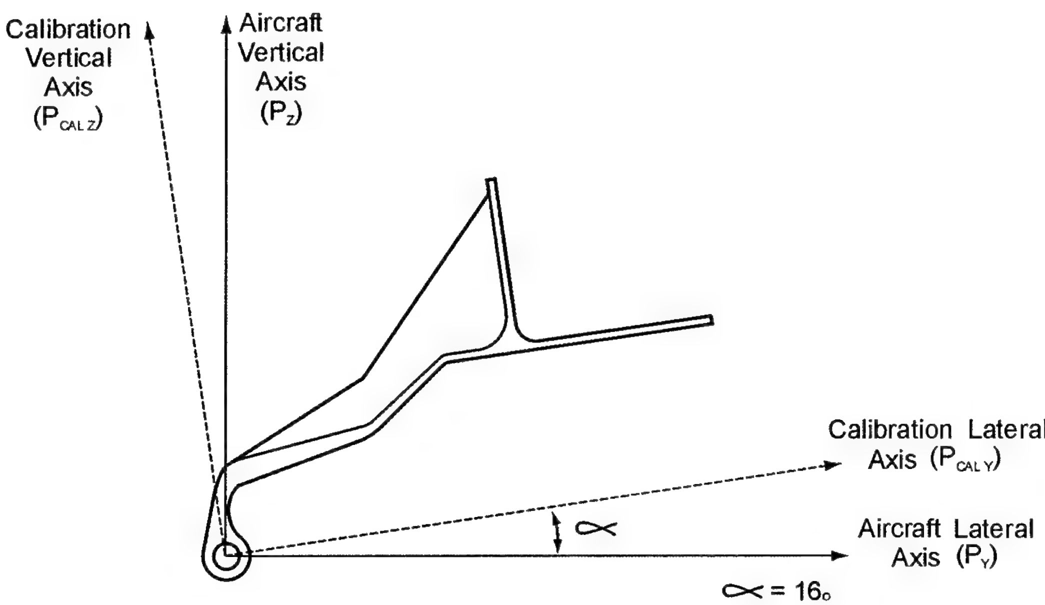


FIGURE 8. BIN A LOWER SUPPORT BRACKET

The following equations were used to resolve the calibration loads into loads along the aircraft axis for both the upper and lower brackets:

$$P_y = P_{caly} * \cos\alpha - P_{calz} * \sin\alpha \quad (1)$$

$$P_z = P_{calz} * \cos\alpha + P_{caly} * \sin\alpha \quad (2)$$

P_y and P_z are the resultant loads in the aircraft Y and Z axes respectively. P_{caly} and P_{calz} are the loads measured during the calibration in the support bracket Y and Z axes respectively. Alpha (α) is the angle between the load measured in the calibration axes and the aircraft axes.

The results of the force balance for bin A are presented in table 4. Bin A was calibrated to 1762 pounds (target weight 1812 pounds); therefore the total static reaction load in the X direction should be 1762 pounds. In other words, the sum of the reaction loads in the X direction should be equal to 1762 pounds which was the applied load. There was no load in the Y or Z direction therefore the reaction loads in these directions is zero. The weight of the bin, which normally would be recorded in the Z direction, was zeroed out by the data acquisition system prior to the start of the calibration.

TABLE 4. BIN A CALIBRATION FORCE BALANCE

Support	Load X (lb)	Load Y (lb)	Load Z (lb)
AU75 (aft)	436	-6	-6
AU76 (center)	590	51	-1
AU78 (forward)	44	-71	-18
AL78 (aft)	129	-104	35
AL76 (center)	328	-37	-41
AL75 (forward)	227	128	49
Reaction Load	1754	-39	18
Expected Reaction Load	1762	0	0
Difference	8	-39	18

Due to the complex geometry of the support brackets, completely isolating the loads into the X, Y, and Z components was difficult. Strain gages were applied to the support brackets to read reaction loads in the X, Y, and Z directions; however, it was not possible to completely isolate these load paths. Consequently, while pulling in the X direction, reaction loads read in the Y and Z directions. The differences that were recorded in the X, Y, and Z directions are within acceptable limits and it is felt that the force balance was valid and all loads were within acceptable limits.

BIN B.

Bin B was held in place by 11 support brackets. The support bracket locations can be seen in figure 9. Two of these support brackets, labeled 5 and 6, were attached to the outboard side of the bin and primarily carried loads in the X direction. Supports 5 and 6 were attached to a flange that was attached to the fuselage frame sections. The five support brackets labeled 7, 8, 9, 10, and 11 were mounted directly to the fuselage frame sections and were connected to the bin through a support rail that ran longitudinally along the length of the bin. These five support brackets carried loads primarily in the Y and Z directions. The remaining four brackets labeled 1, 2, 3, and 4 carried loads primarily in the Z direction. These support brackets were attached from the bin to a frame section in pairs that lined up in series. Support brackets 2 and 3 were in series at the forward end of the bin while support brackets 1 and 4 were in series at the aft end of the bin.

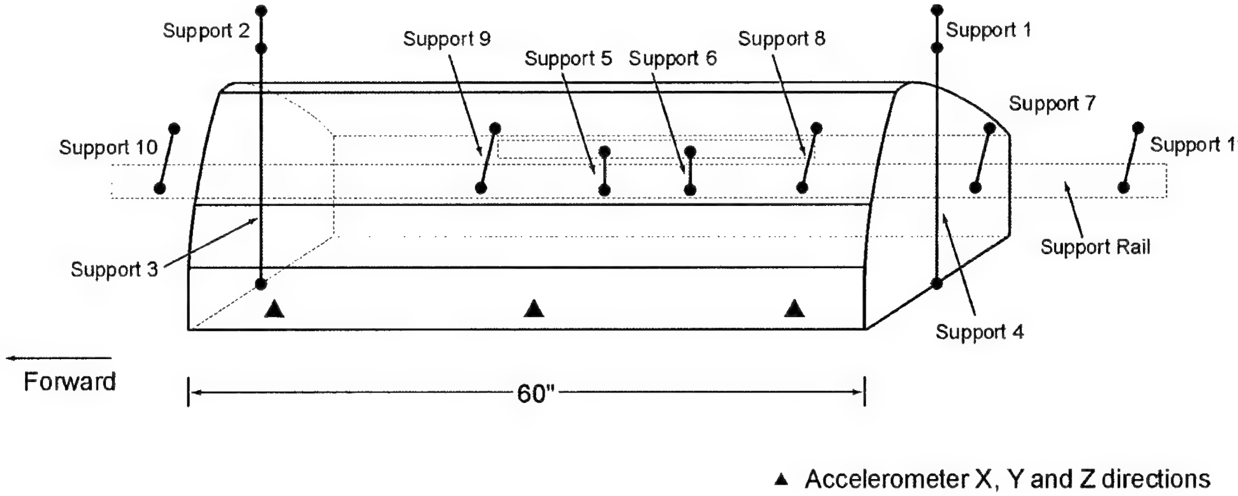


FIGURE 9. BIN B SUPPORT BRACKET LOCATIONS

To determine if all the forces on bin B were within acceptable limits and in equilibrium, a force balance was calculated using the load data of the support brackets collected during the static calibration test. Before this could be accomplished, the loads recorded in each of the support brackets had to be resolved along the aircraft vertical and lateral axes as was accomplished for bin A. Support brackets 1-4 measured strictly in the Z direction and support brackets 4, 5, and 6 measured primarily in the X direction so the forces in these brackets were not resolved. Support brackets 7-11 have an offset of 6 degrees from the lateral (y) axis ($\alpha = 6$ degrees), and 28 degrees from the vertical (z) axis ($\beta = 28$ degrees) when compared to the vertical and lateral aircraft axes. A diagram of support brackets 7-11 showing the related axes is seen in figure 10. The following equations were used to resolve calibration loads into loads along the aircraft axis:

$$P_y = P_{caly} * \cos\alpha + P_{calz} * \sin\beta \quad (3)$$

$$P_z = P_{calz} * \cos\beta + P_{caly} * \sin\alpha \quad (4)$$

P_y and P_z are the resultant loads in the aircraft Y and Z axes respectively. P_{caly} and P_{calz} are the loads measured during the calibration in the Y and Z axes respectively. Alpha (α) and beta (β) are the angles between the calibration axes and the airplane lateral and vertical axes.

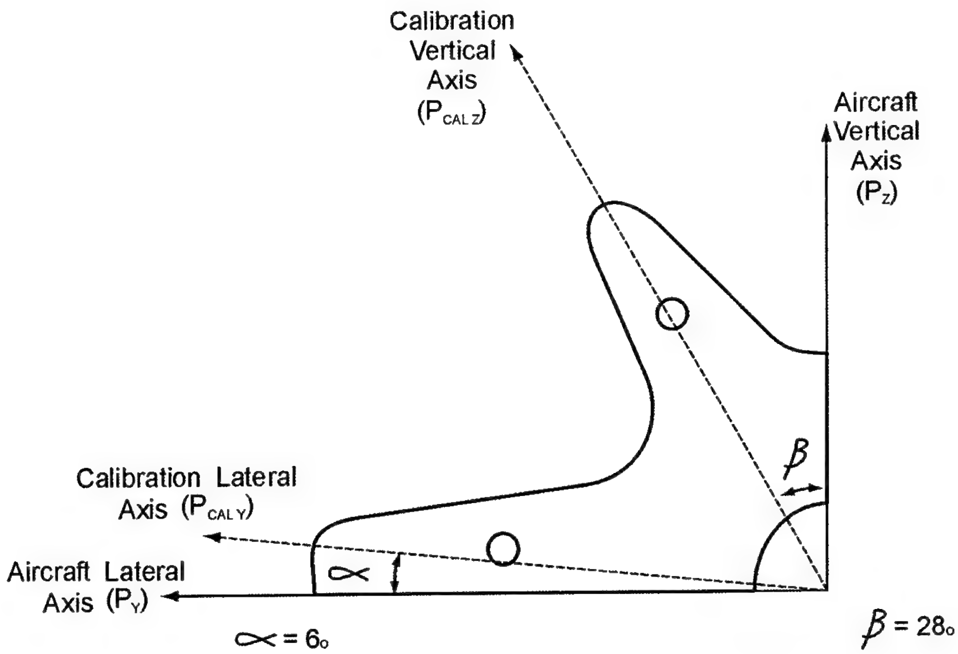


FIGURE 10. BIN B SUPPORT BRACKETS 7-11

A force balance was calculated from the calibration of bin B and the results are shown in table 5. Bin B was calibrated to 981 pounds (target weight was 1038 pounds) therefore the total static reaction load in the X direction should be 981 pounds. There was no load in the Y or Z direction therefore the reaction loads in these directions is zero. The weight of the bin, which normally would be recorded in the Z direction, was zeroed out by the data acquisition system prior to the start of the calibration.

TABLE 5. BIN B CALIBRATION FORCE BALANCE

Support	Load X (lb)	Load Y (lb)	Load Z (lb)
1	-	-	-15
2	-	-	-36
3	-	-	-
4	-	-	-10 (not used)
5	469	-	-
6	413	-	-
7	-	11	-13
8	-	-21	-12
9	-	-50	-2
10	-	-99	-21
11		-15	-38
Reaction Load	882	-188	-137
Expected Reaction Load	981	0	0
Difference	99	188	137

Support brackets 2 and 3 as well as support brackets 1 and 4 are positioned in series. Therefore, the load read in these support brackets (for example 1 and 4) should be identical and only one of the pair was used in the force balance calculation. Support bracket 3 was recording erroneous data during the calibration and therefore its data were not used for analysis. All other loads were within acceptable limits.

Due to the complex geometry of the support brackets, completely isolating the loads in the X, Y, and Z components was difficult. Strain gages were applied to the support brackets to read reaction loads in the X, Y, and Z directions; however, it was not possible to completely isolate these load paths. Consequently, while pulling in the X direction, reaction loads read in the Y and Z directions. The differences that were recorded in the X, Y, and Z directions are within acceptable limits and it is felt that the force balance was valid and all loads were within acceptable limits.

LONGITUDINAL TESTS

TEST 1.

The first test was scheduled to be a 6-g test. The actual sled peak acceleration was 6.1 g's with a velocity change of 23.2 ft/sec.

The fuel tank separated from its mounting as a result of the acceleration. Damage to the tank occurred at the forward end of both hanging flanges. The damage, which can be seen in figure 11, was a shearing failure of the flange as a result of the flange being forced forward against the keeper blocks.

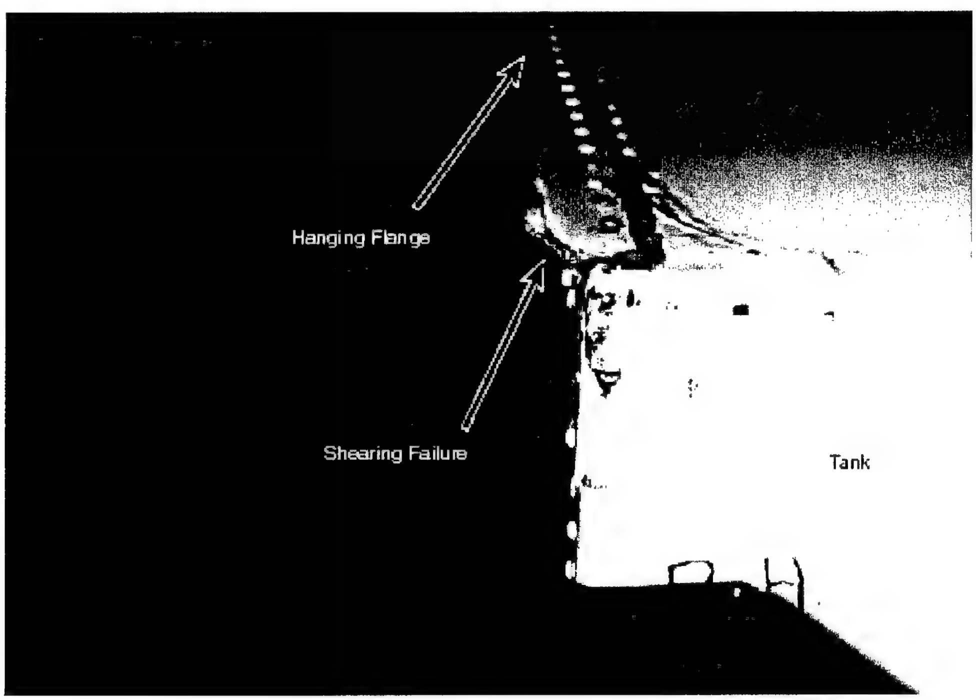


FIGURE 11. HANGING FLANGE SHEARING FAILURE

The hanging rails, keeper blocks, and the bottom straps were damaged in the test. Both hanging rails experienced bending and tearing at the forward end. The keeper blocks both failed in shear when the tank hanging flange was forced against the keeper blocks. Damage to the hanging flange and keeper block can be seen in figure 12. In addition, the bottom straps were pulled from the fuselage floor at the attachment point as a result of the tank's forward load. The bottom strap damage can be seen in figure 13.

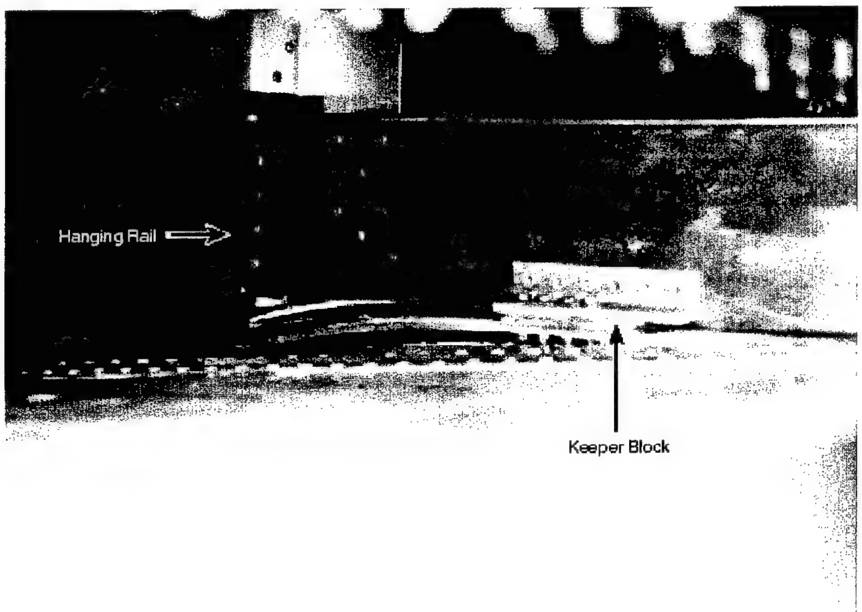


FIGURE 12. HANGING FLANGE AND KEEPER BLOCK DAMAGE

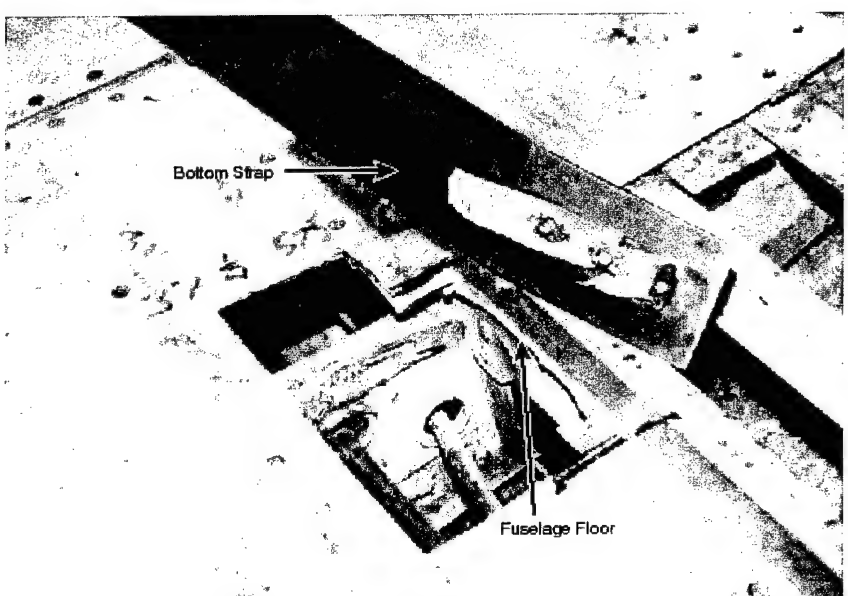


FIGURE 13. BOTTOM STRAP ATTACHMENT POINT DAMAGE

Due to excessive damage, the auxiliary fuel tank was removed for subsequent tests.

The overhead bins and the fuselage experienced no noticeable damage during the test.

TEST 2.

The second test was scheduled to be a 9-g test. The actual sled peak acceleration was 8.2 g's with a velocity change of 32.2 ft/sec.

No significant damage was observed to either bin or to the fuselage as a result of this test.

TEST 3.

The third test was scheduled to be a 16-g test. The actual sled peak acceleration was 14.2 g's with a velocity change of 41.7 ft/sec.

Bin A experienced separation from the airframe during test 3. The support rail, to which all three upper support brackets were attached, broke at all the frame section attachment points. The upper support brackets did remain attached to the bin as well as the support rail. However, since the support rail broke free at all the frame section attachment points, there was nothing to support the bin once it became free. Examples of the damage to the fuselage frame at the rail attachment points can be seen in figures 14 and 15.

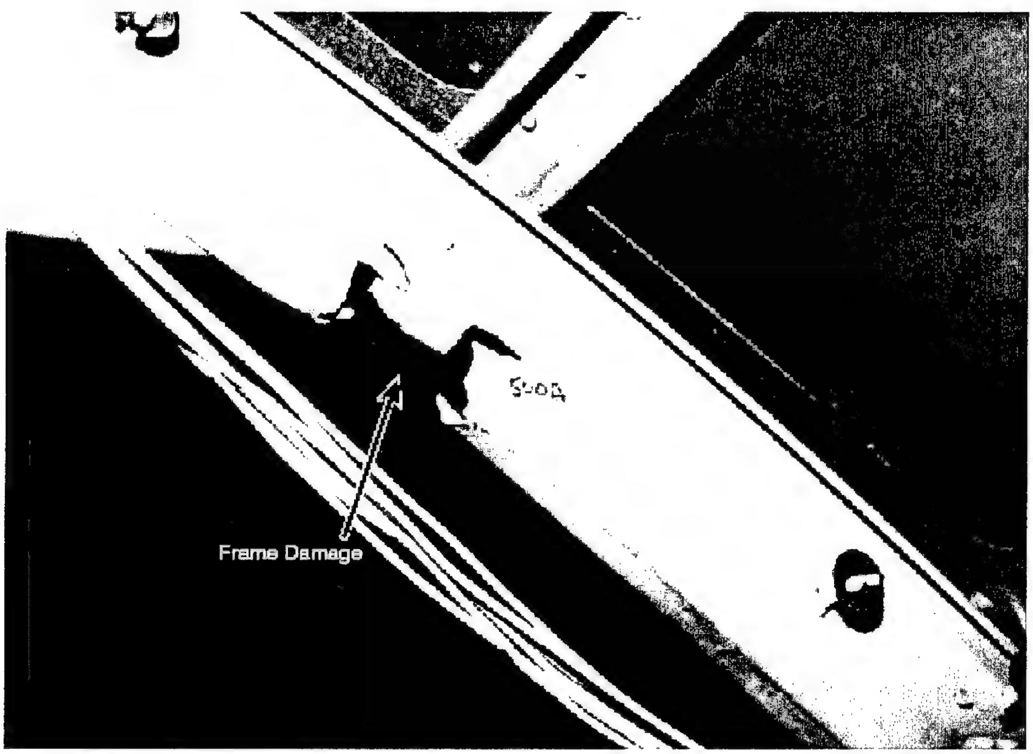


FIGURE 14. FRAME DAMAGE AT HANGING RAIL ATTACHMENT POINT FS 500

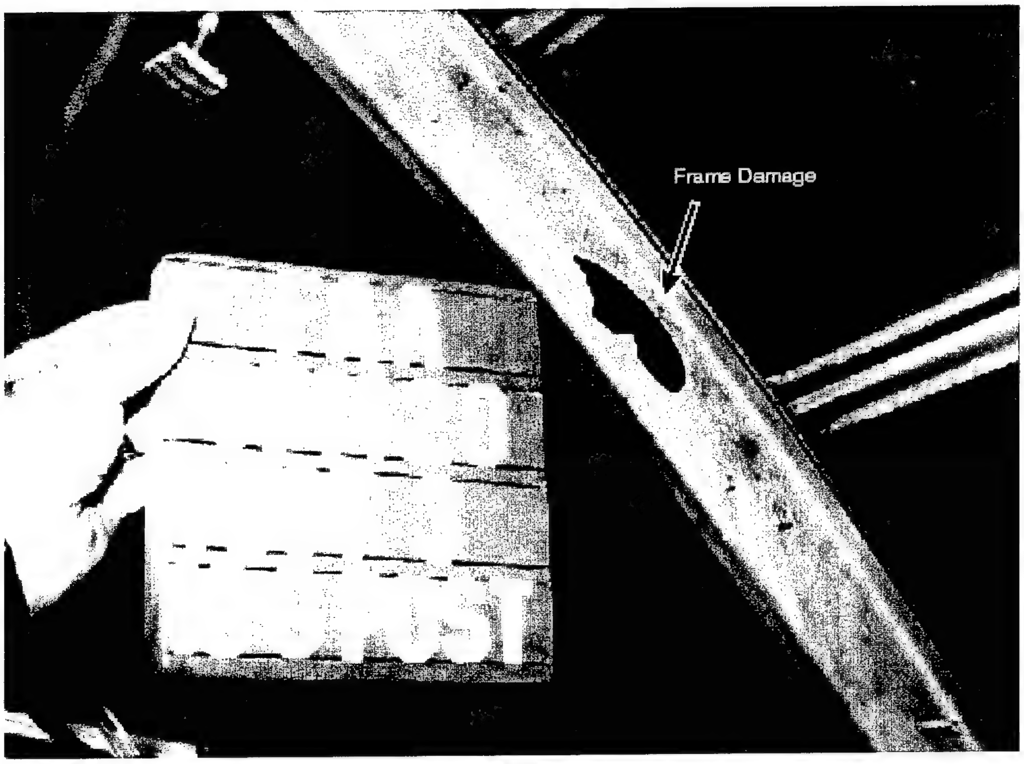


FIGURE 15. FRAME DAMAGE AT HANGING RAIL ATTACHMENT POINT FS 500A

The lower support brackets experienced various separation modes as a result of the test.

The forward support bracket, AL75, was mounted by bolting the support bracket to an air duct and was also attached to the fuselage frame through a link/turnbuckle assembly. After the test, the support bracket remained attached to the frame through the link/turnbuckle assembly; however, the bracket had completely separated from the air duct. The four bolts that held the support bracket to the air duct tore through the air duct. This damage can be seen in figure 16. In addition to the support bracket separating at the air duct, the bin separated at the support bracket. The adhesive in the bin honeycomb material failed and the bin separated from the support bracket; this can also be seen in figure 16.

The center of the three support brackets, AL76, was bolted to the air duct and also was attached to the fuselage frame through a link/turnbuckle assembly. The link/turnbuckle assembly was bolted to a flange that bolted to the fuselage frame. After the test, the support bracket remained attached to the bin; however, the support bracket completely separated from the air duct and the flange separated from the fuselage frame. The damage to the air duct can be seen in figure 17. The support bracket is shown in figure 18 and the separated flange and link/turnbuckle assembly can be seen in figure 19.

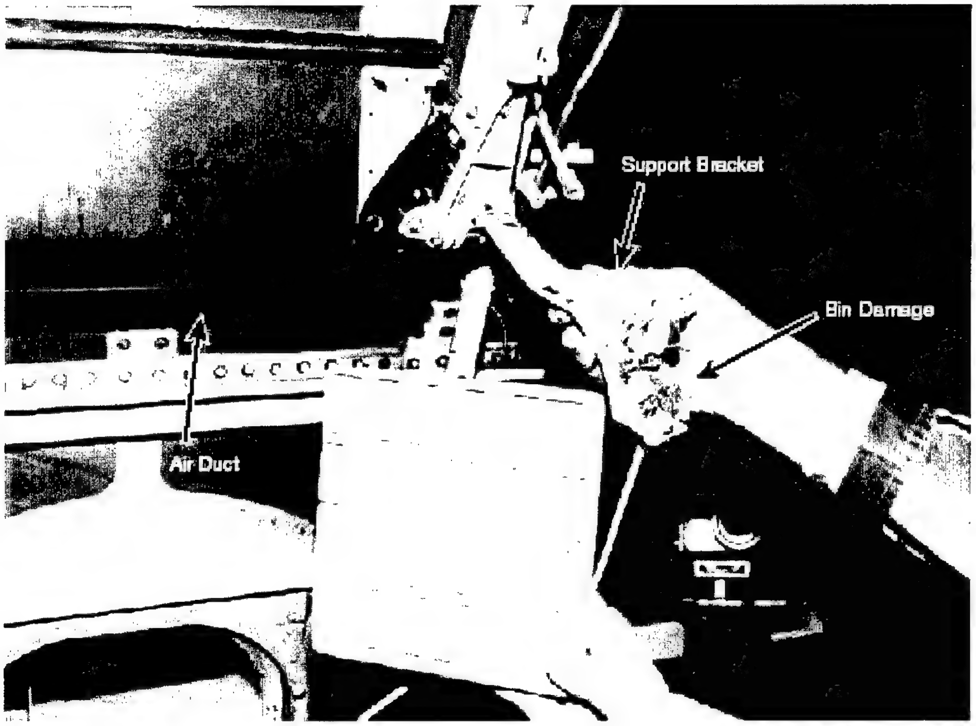


FIGURE 16. SUPPORT BRACKET AL75 AIR DUCT AND BIN DAMAGE

FIGURE 17. SUPPORT BRACKET AL76 AIR DUCT DAMAGE

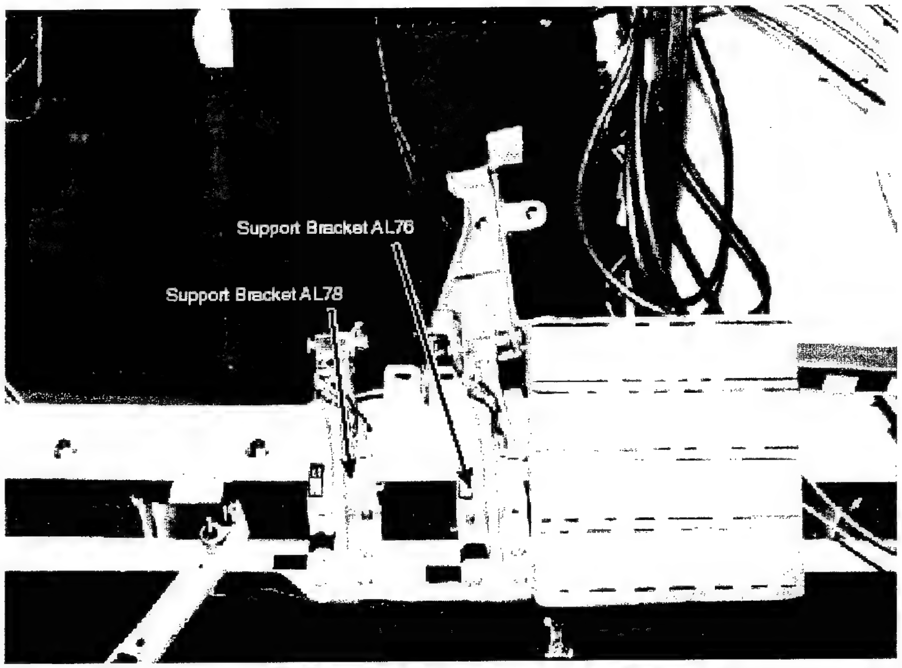


FIGURE 18. SUPPORT BRACKET AL76 AND AL78

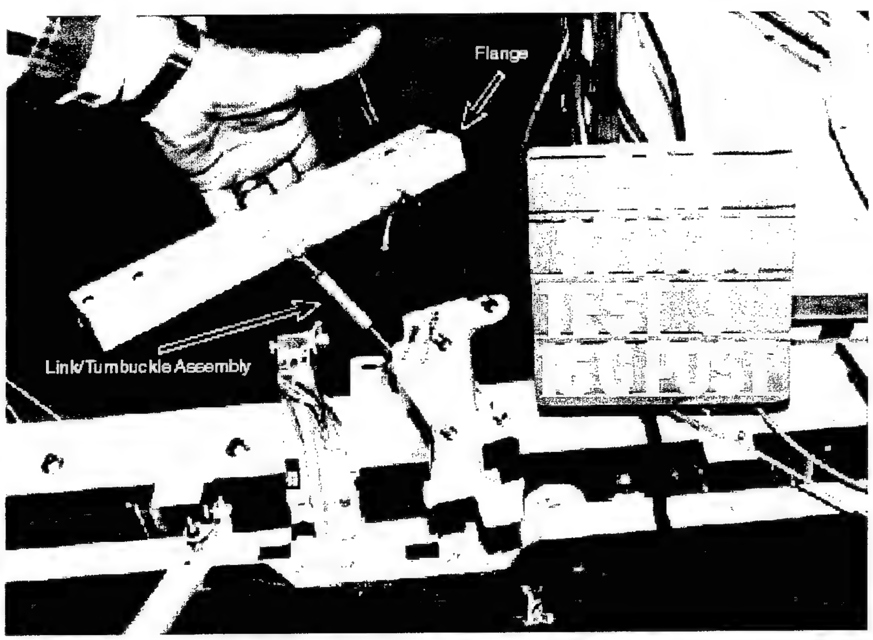


FIGURE 19. SUPPORT BRACKET AL76 SEPARATED FLANGE

The rear lower support bracket, AL78, was attached to the fuselage frame through a link/turnbuckle assembly. The link/turnbuckle assembly separated from the fuselage frame as a result of the test. A photograph showing support bracket AL78, after the test, can be seen in figure 18. Damage to the fuselage frame at the link/turnbuckle assembly attachment point is shown in figure 20.

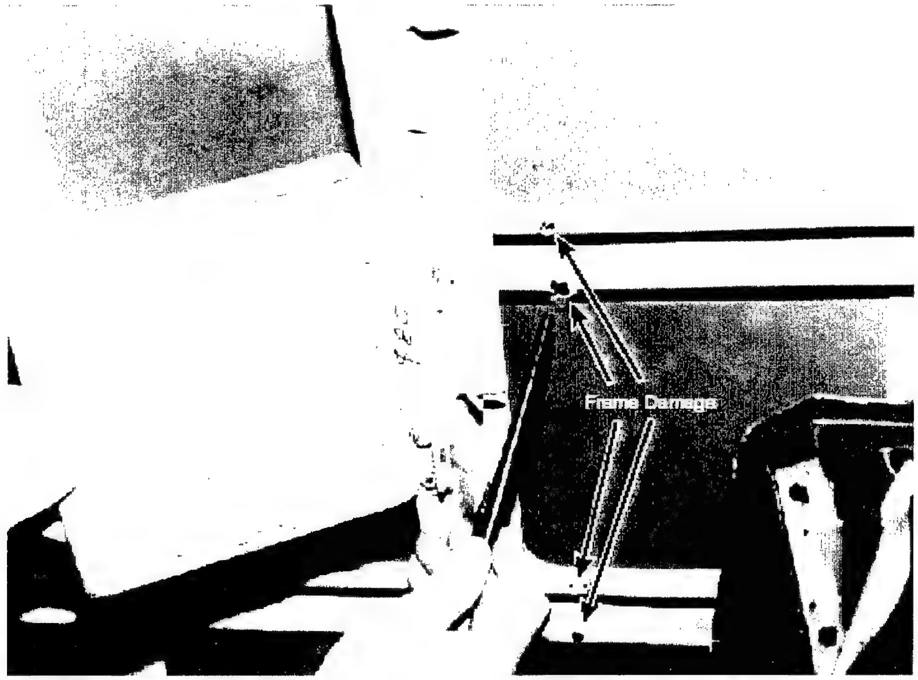


FIGURE 20. FUSELAGE FRAME DAMAGE

As a result of all the structural separations, bin A completely broke loose from its mounting.

Bin B experienced no significant structural damage as a result of this test.

ANALYSIS

AUXILIARY FUEL TANK.

The auxiliary fuel tank completely separate from its mounting during the 6-g test. Separation began at approximately 64 ms at a g level of 5.5, and was complete at approximately 76 ms at a g level of 5.2.

BINS.

BIN A. For bin A the peak reactive loads in the support brackets were seen at 102, 93, and 66 ms for the 6, 9, and 16-g tests respectively. The resolved reactive loads at these times in the X, Y, and Z direction and the expected loads for the same times are shown in table 6. The expected load is the weight of the bin multiplied by the measured acceleration of the bin in the corresponding axis. This is calculated from the kinematic equation:

$$F = m * a \tag{5}$$

where F is the force, m is the weight of the bin, and a is the bin acceleration (in theory m is the mass of the bin, however, the mass and the weight are constant therefore for the purposes of this analysis the bin weight can be used) Bin A had three accelerometers attached to its underside.

One accelerometer was located in the front, one in the center, and one in the rear. For the purpose of this analysis, an average of the three accelerations was calculated and used as the bin acceleration (a).

TABLE 6. BIN A RESOLVED REACTIVE LOADS, 6-g TEST AT 102 ms

Support	Load X (lb)	Load Y (lb)	Load Z (lb)
AU75 (aft)	464	15	-74
AU76 (center)	702	-62	-162
AU78 (forward)	69	-49	36
AL78 (aft)	141	139	-113
AL76 (center)	437	56	6
AL75 (forward)	285	-130	32
Reaction Load	2098	-31	-275
Expected Load	1714	-116	-10
Difference	384	85	265

As seen in tables 7 and 8, at the time of peak X-direction loads, reaction and expected loads were closely correlated. Differences in the reaction and expected loads are expected because of the inability to isolate load paths in the X, Y, and Z directions. Additional errors may exist due to the method used to calculate acceleration. Acceleration was determined to be an average of three accelerations measured at three different locations on the bin. This could cause the calculated average to be different than the actual acceleration resulting in differences between the actual loads and the calculated loads.

To observe how bin A reacts over time, the sum of the X-direction measured load in the support brackets was compared to the expected load in the X direction. The expected load was calculated by multiplying the weight of the bin by the measured acceleration using equation 5. As stated above, the acceleration was the average of three measured values. The expected load was compared to the sum of the X-direction support bracket measured loads in figures 21, 22, and 23 for the 6-, 9-, and 16-g tests respectively.

TABLE 7. BIN A RESOLVED REACTIVE LOADS, 9-g TEST AT 93 ms

Support	Load X (lb)	Load Y (lb)	Load Z (lb)
AU75 (aft)	606	8	-117
AU76 (center)	935	-16	-159
AU78 (forward)	202	27	189
AL78 (aft)	196	39	-194
AL76 (center)	625	230	1
AL75 (forward)	492	102	53
Reaction Load	3056	102	-227
Expected Load	2952	0	-103
Difference	102	102	124

TABLE 8. BIN A RESOLVED REACTIVE LOADS, 16-g TEST AT 66 ms

Support	Load X (lb)	Load Y (lb)	Load Z (lb)
AU75 (aft)	854	195	-89
AU76 (center)	1235	-12	-260
AU78 (forward)	459	38	89
AL78 (aft)	268	-291	-283
AL76 (center)	913	55	7
AL75 (forward)	709	329	60
Reaction Load	4438	314	-478
Expected Load	4240	499	-180
Difference	198	185	298

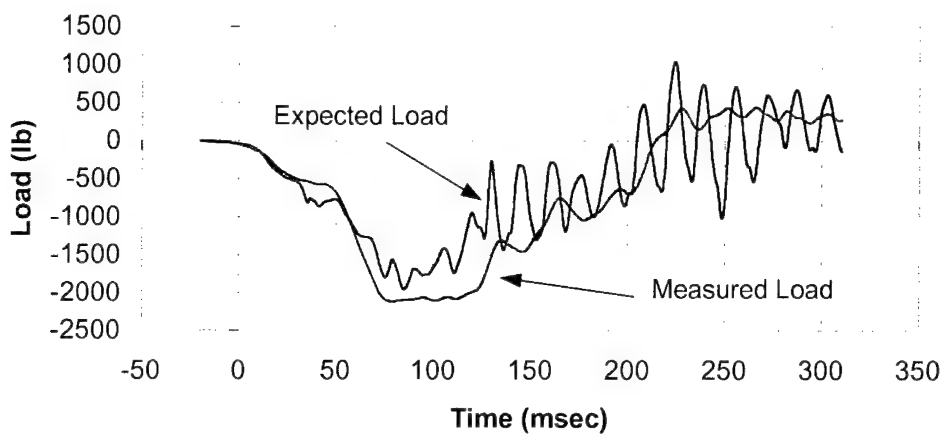


FIGURE 21. BIN A, EXPECTED LOAD COMPARED TO MEASURED LOAD, 6-g TEST

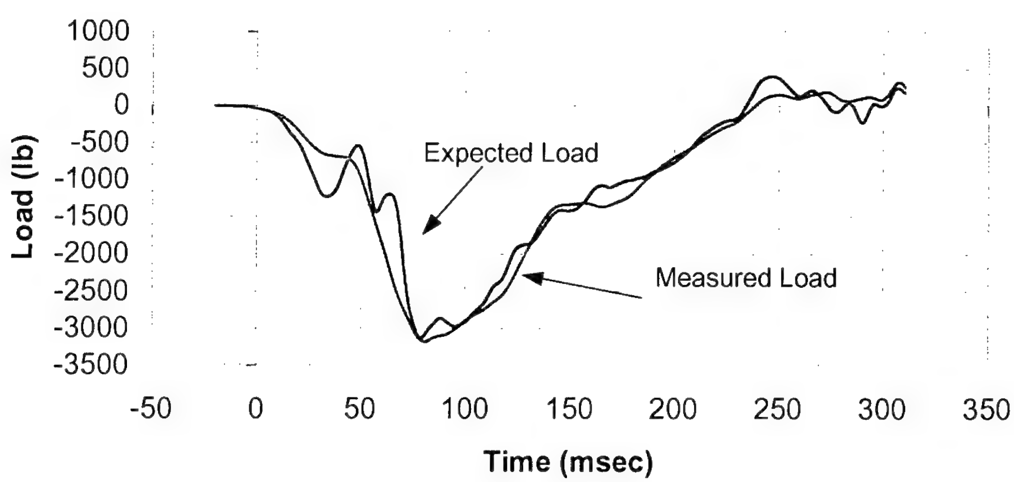


FIGURE 22. BIN A, EXPECTED LOAD COMPARED TO MEASURED LOAD, 9-g TEST

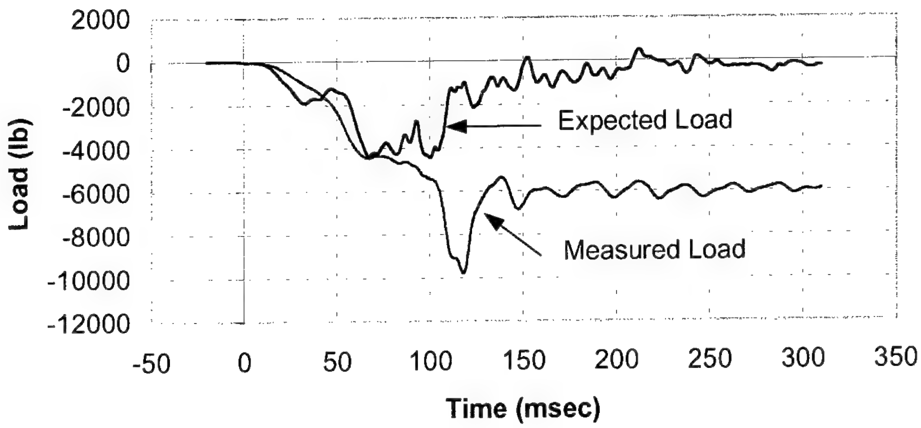


FIGURE 23. BIN A, EXPECTED LOAD COMPARED TO MEASURED LOAD, 16-g TEST

A close agreement between the two curves in these graphs shows that the load measured during the test is what would be expected given the bin acceleration. The two curves for the 16-g test are not expected to be close after approximately 66 ms due to the separation of the bin at its attachments.

The loads in the X direction in the 6-g static test and the 6-g dynamic test were compared at the point when the g level during the dynamic test was equal to the load applied during the static test. For bin A, a static load of 1762 lbs was applied which corresponds to 5.83 g since the bin weighed 302 pounds. This g level is calculated using equation 5. At 74 ms the acceleration of bin A in the 6-g test was 5.83. The comparison is presented in table 9. This table shows a close correlation of the loads for the static and dynamic tests.

TABLE 9. BIN A STATIC VERSUS DYNAMIC DERIVED LOADS IN X DIRECTION

Support	Load (lb)	
	Static	Dynamic
AU75 (aft)	436	468
AU76 (center)	590	614
AU78 (forward)	87	213
AL78 (aft)	129	120
AL76 (center)	328	418
AL75 (forward)	227	236
Total Load	1797	2069
Difference	272	

During the third test, bin A was completely separated from the fuselage at approximately 66 ms. At the time of separation, there was a longitudinal load of approximately 4438 pounds in the support brackets and the bin was experiencing a longitudinal acceleration of approximately 14.5 g's. This g level is an average of the three accelerometers located on the bin.

BIN B. For bin B the peak loads were seen at 109, 108, and 95 ms for the 6-, 9-, and 16-g tests respectively. The loads in the X, Y, and Z direction at these times, as well as the expected loads in these directions at identical times, are shown in tables 10, 11, and 12 for the 6-, 9-, and 16-g tests respectively.

The expected load, calculated using equation 5, is the weight of the bin multiplied by the average measured acceleration of the bin in the corresponding axis. Bin B had three accelerometers attached to its underside. One accelerometer was located in the front, one in the center, and one in the rear.

TABLE 10. BIN B RESOLVED REACTIVE LOADS, 6-g TEST AT 109 ms

Support	Load X (lb)	Load Y (lb)	Load Z (lb)
1	-	-	-22
2	-	-	-78
3	-	-	NA
4	-	-	-11
5	650	-	-
6	553	-	-
7	-	30	4
8	-	-48	-48
9	-	-45	-8
10	-	0	43
11	-	-15	2
Reaction Load	1203	-78	-137
Expected Load	1240	-90	-53
Difference	37	12	84

TABLE 11. BIN B RESOLVED REACTIVE LOADS, 9-g TEST AT 108 ms

Support	Load X (lb)	Load Y (lb)	Load Z (lb)
1	-	-	6
2	-	-	-69
3	-	-	NA
4	-	-	-10
5	-845	-	-
6	-724	-	-
7	-	33	-42
8	-	-62	-65
9	-	-5	-17
10	-	106	107
11	-	-35	-11
Reaction Load	1570	36	-91
Expected Load	1540	15	21
Difference	30	16	70

TABLE 12. BIN B RESOLVED REACTIVE LOADS, 16-g TEST AT 95 ms

Support	Load X (lb)	Load Y (lb)	Load Z (lb)
1	-	-	-77
2	-	-	-266
3	-	-	NA
4	-	-	-113
5	1542	-	-
6	1368	-	-
7	-	-9	-164
8	-	-76	-66
9	-	-5	-17
10	-	106	107
11	-	-160	-162
Reaction Load	2912	349	-452
Expected Load	2845	126	-169
Difference	67	223	283

Tables 10 through 12 show a close correlation between reaction and expected loads at the time of peak X-direction loads in the support brackets. Differences in the reaction and expected loads are expected because of the inability to isolate load paths in the X, Y, and Z directions. As for bin A, additional errors may exist due to averaging used to calculate acceleration from the three accelerations measured at three different locations on the bin.

To observe how bin B reacts over time, a sum of the X-direction measured load in the support brackets was compared to the expected load in the X direction. The expected load was calculated by multiplying the weight of the bin by the measured acceleration using equation 5, using the average of the three accelerations on the bin used for this calculation. The expected load is compared to the sum of the support bracket measured loads in figures 24, 25, and 26 for the 6-, 9-, and 16-g tests respectively.

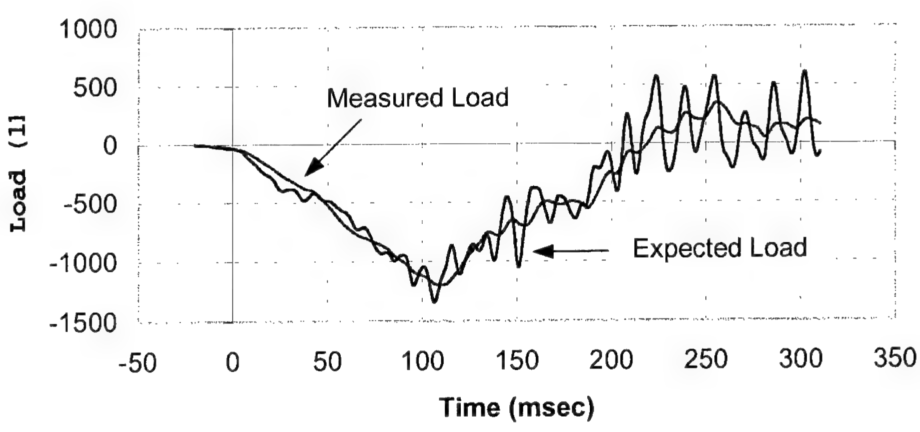


FIGURE 24. BIN B, EXPECTED LOAD COMPARED TO MEASURED LOAD, 6-g TEST

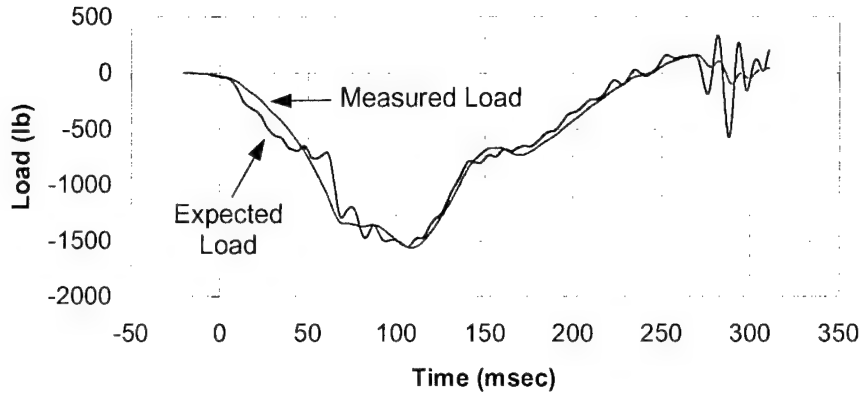


FIGURE 25. BIN B, EXPECTED LOAD COMPARED TO MEASURED LOAD, 9-g TEST

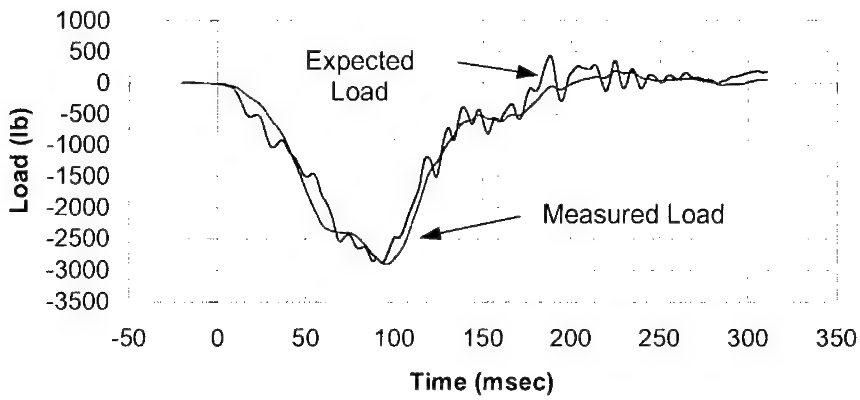


FIGURE 26. BIN B, EXPECTED LOAD COMPARED TO MEASURED LOAD, 16-g TEST

These graphs show a close correlation between the load measured and the expected load.

A comparison was made of the 6-g static test and the 6-g dynamic test in the X direction. This comparison was made when the g level during the dynamic test was equal to the load applied during the static test. For bin B, a static load of 981 lbs was applied which corresponds to 5.68 g since the bin weighed 173 pounds. At 84 ms the average acceleration of bin B was 5.68. The comparison is presented in table 13.

TABLE 13. BIN B STATIC VERSES DYNAMIC DERIVED LOADS IN X DIRECTION

Support	Load (lb)	
	Static	Dynamic
5	469	510
6	413	436
Total Load	882	946
Difference	64	

DISPLACEMENTS. String potentiometers were attached to the auxiliary fuel tank to measure longitudinal displacement. Due to the structural separation of the tank, the string potentiometer data was not useful.

A string potentiometer was attached to the aft side panel of each bin. These string potentiometers were to record longitudinal displacements during the tests. Longitudinal displacement as well as corresponding times for the bins are shown in table 14.

TABLE 14. LONGITUDINAL DISPLACEMENTS AND CORRESPONDING TIMES

Test	Bin A		Bin B	
6 g	0.28 inch	108 ms	0.13 inch	116 ms
9 g	0.49 inch	103 ms	0.18 inch	119 ms
16 g	NA	NA	0.39 inch	97 ms

Due to the separation of the bin from the fuselage during the 16-g test of bin A, no usable data were obtained from the string potentiometer.

SUMMARY

During the 6-g test a peak acceleration of 6.1 g's was reached with a velocity change of 23 ft/sec. As a result of this test the auxiliary fuel tank broke free of its mounting. No noticeable effect was seen on the overhead stowage bins. The fuel tank was removed for subsequent tests.

The 9-g test saw a peak acceleration of 8.2 g's with a velocity change of 32.2 ft/sec. No significant damage occurred to the overhead bins as a result of this test.

The 16-g test reached a peak acceleration of 14.2 g's with a velocity change of 41.7 ft/sec. One of the bins broke free of its support brackets as a result of this test. The other bin experienced no significant damage.

Additional data, photographs, and data plots for the bins, tank, and fuselage can be found in FAA report DOT/FAA/AR-99/4, Longitudinal Acceleration Test of Overhead Luggage Bins and Auxiliary Fuel Tank in a Transport Airframe Section.

REFERENCES

1. Aircraft Safety Research Plan, November 1991, Federal Aviation Administration Technical Center, Atlantic City International Airport, NJ 08405.

2. Impact Data from a Transport Aircraft During a Controlled Impact Demonstration, NASA Technical Paper 289, September 1986.

3. Galley and Overhead Compartment Experiment Results—Full-Scale Transport Controlled Impact Demonstration, DOT/FAA/CT-85/33, December 1985, Federal Aviation Administration Technical Center, Atlantic City International Airport, NJ 08405.

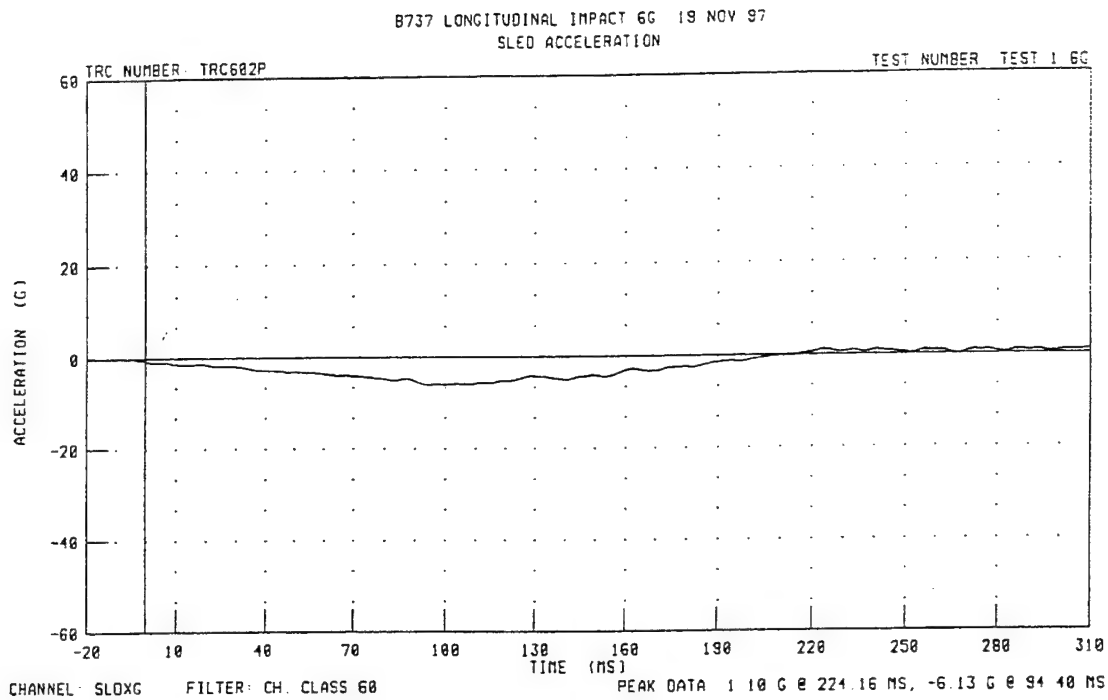
4. Longitudinal Impact Test of a Transport Airframe Section, DOT/FAA/CT-87/26, July 1988, Federal Aviation Administration Technical Center, Atlantic City International Airport, NJ 08405.

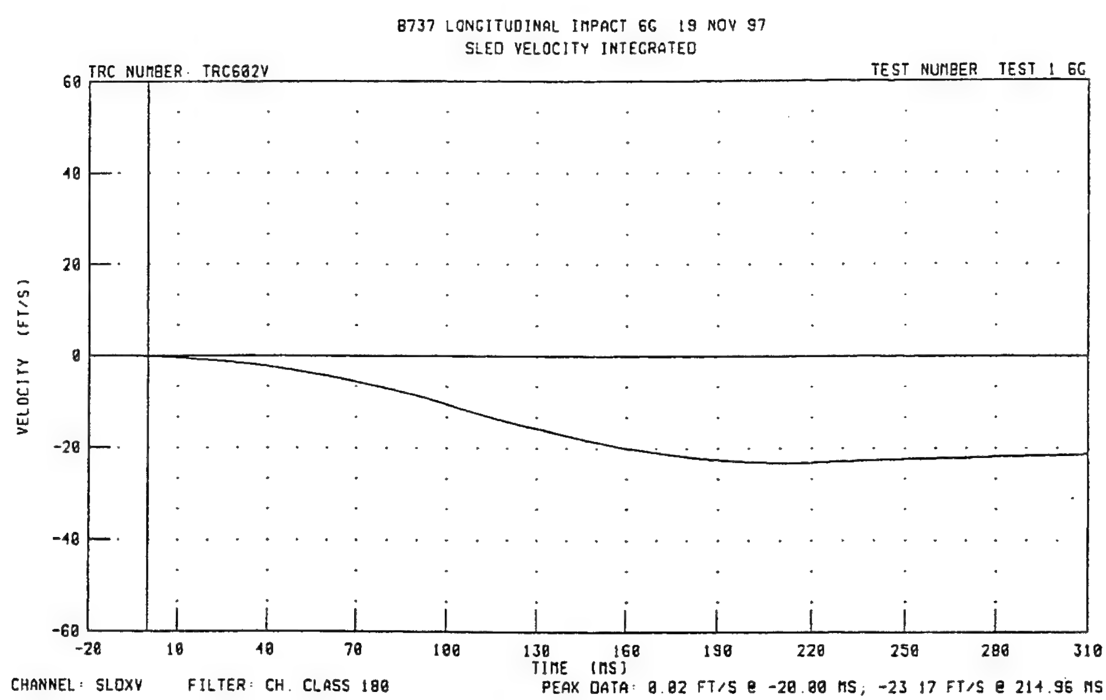
5. Longitudinal Acceleration Test of Overhead Luggage Bins in a Transport Airframe Section, DOT/FAA/CT-92/9, November 1992, Federal Aviation Administration Technical Center, Atlantic City International Airport, NJ 08405.

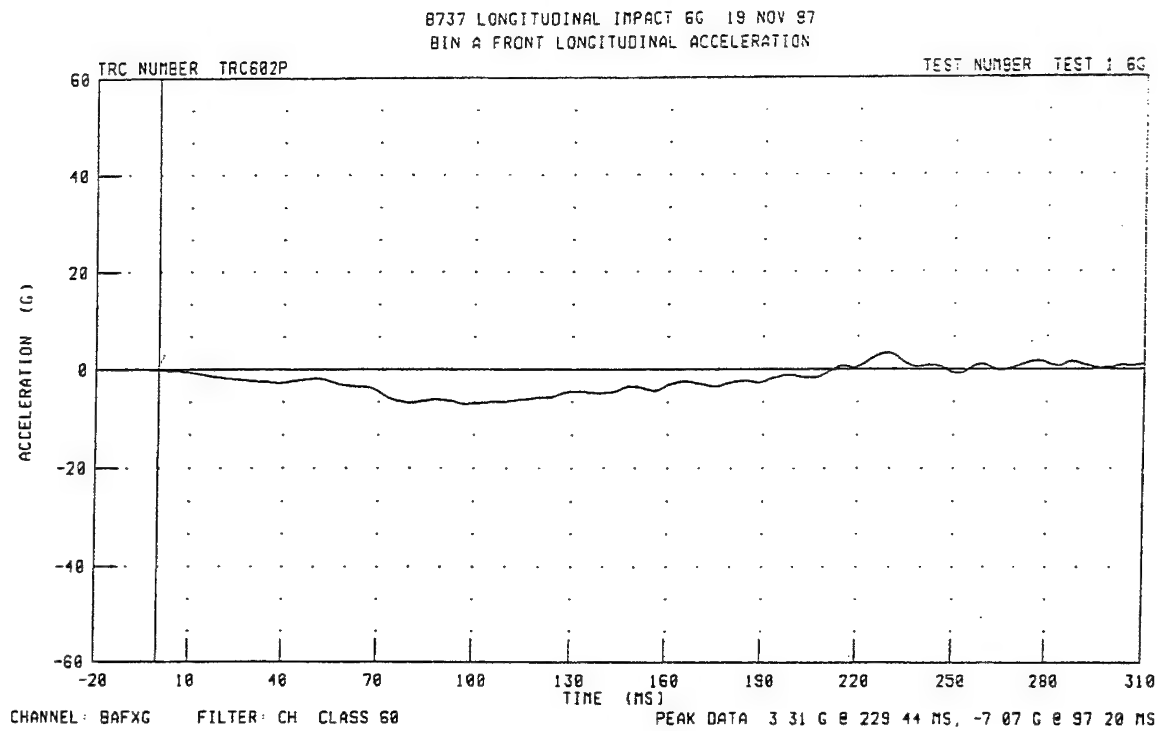
6. Longitudinal Acceleration Test of Overhead Luggage Bins and Auxiliary Fuel Tank in a Transport Airplane Airframe Section, DOT/FAA/AR-99/4, June 1999, Federal Aviation Administration Technical Center, Atlantic City International Airport, NJ 08405.

APPENDIX A—DATA PLOTS

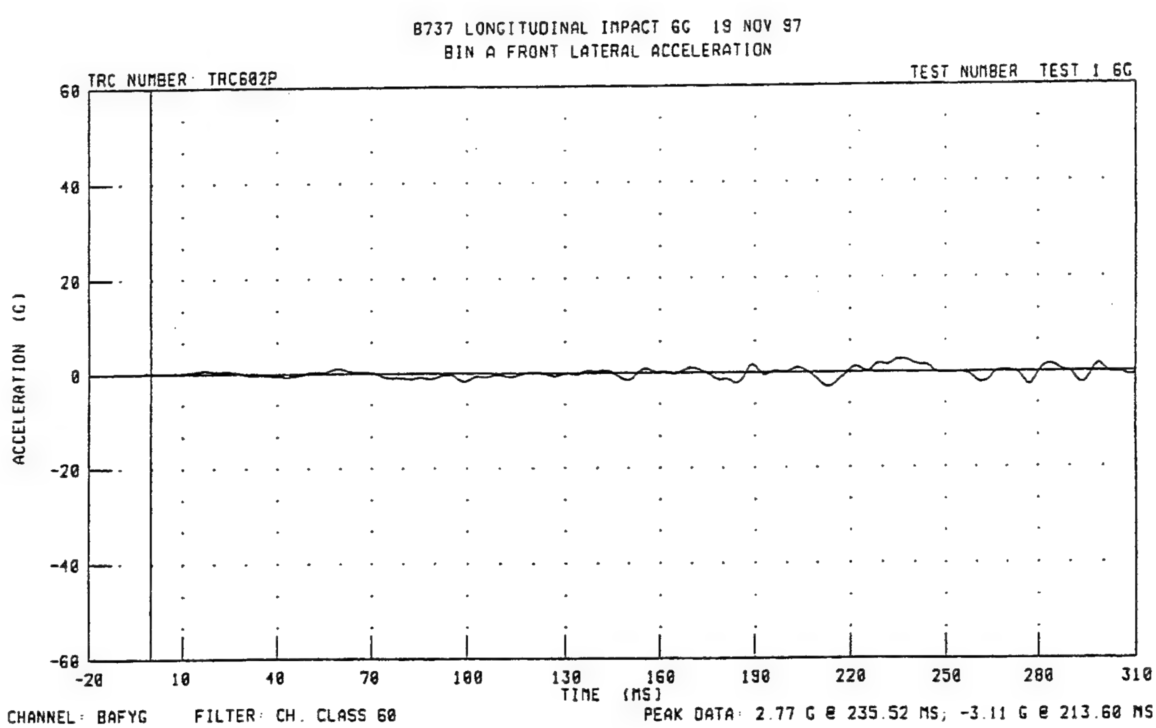
TEST 1



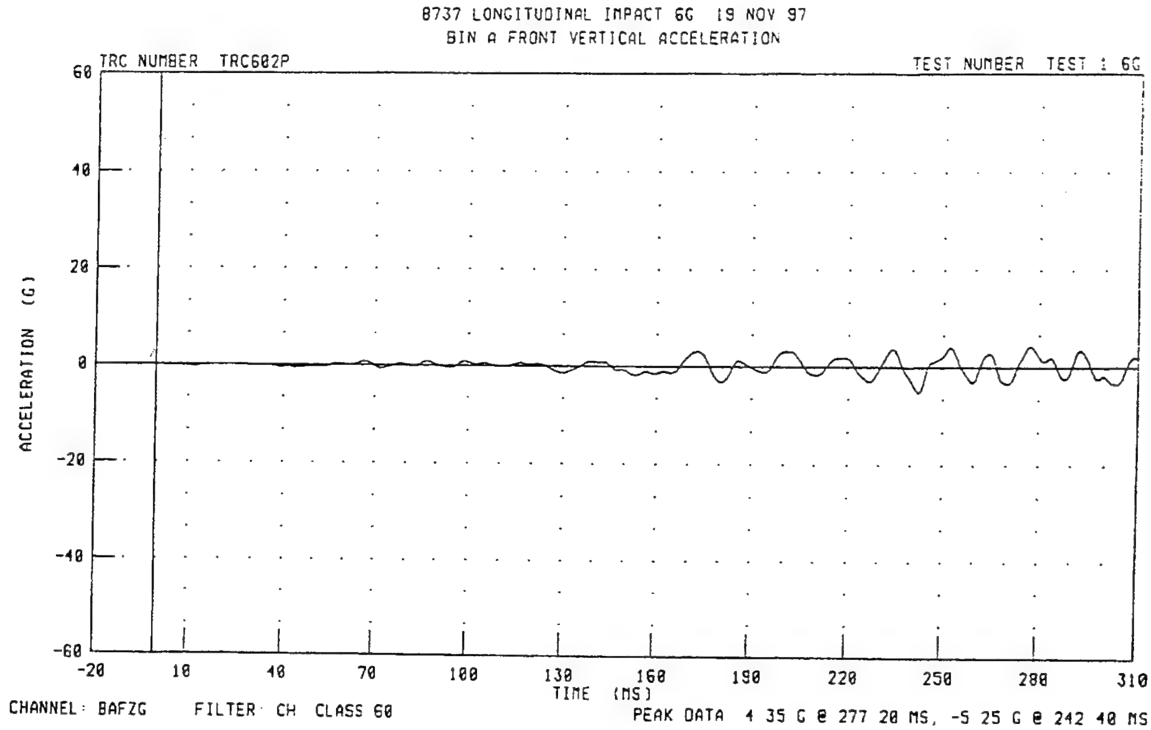




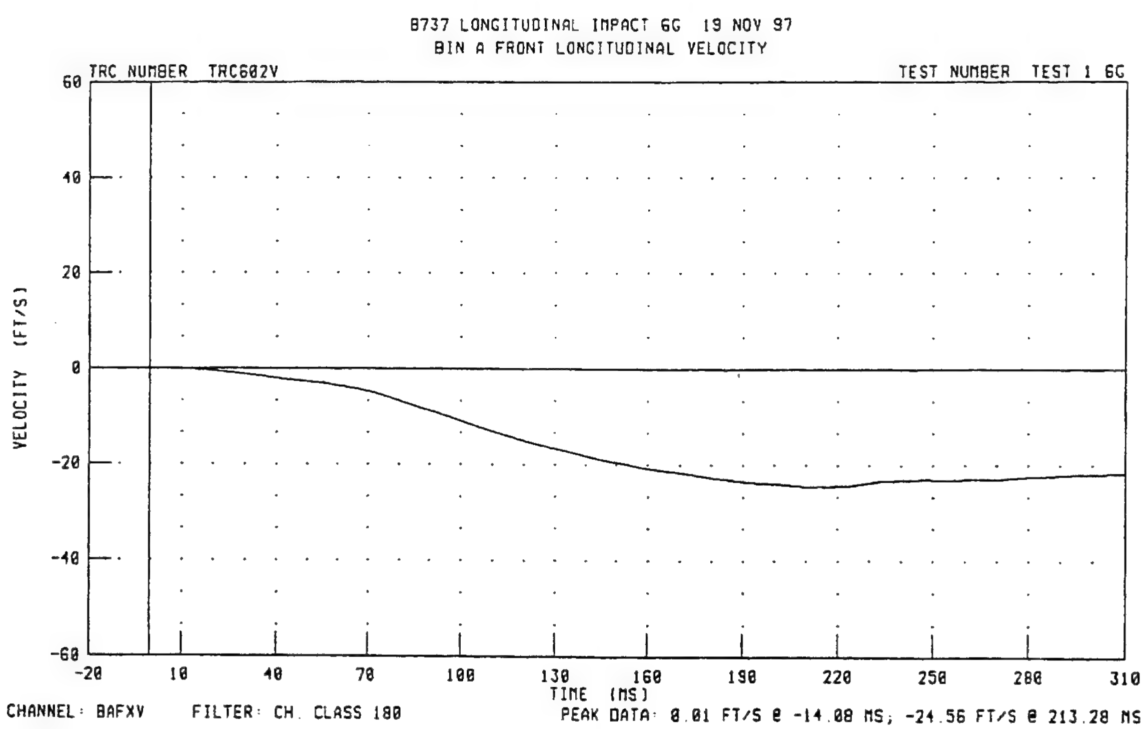
B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN A FRONT LONGITUDINAL ACCELERATION
TRC NUMBER TRC602P
TEST NUMBER TEST 1 6G
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BAFXG FILTER: CH CLASS 60
PEAK DATA 3 31 G @ 229 44 MS, -7 07 G @ 97 20 MS



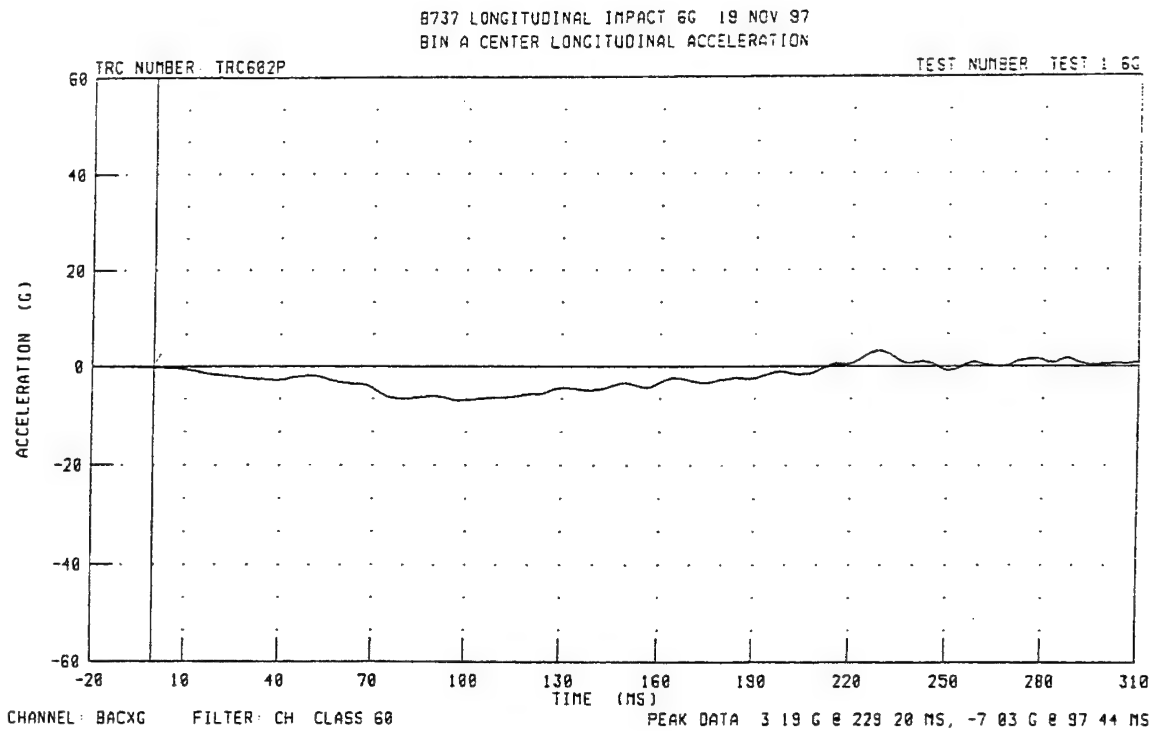
B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN A FRONT LATERAL ACCELERATION
TRC NUMBER: TRC602P
TEST NUMBER TEST 1 6G
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BAFYG FILTER: CH. CLASS 60
PEAK DATA: 2.77 G @ 235.52 MS; -3.11 G @ 213.60 MS

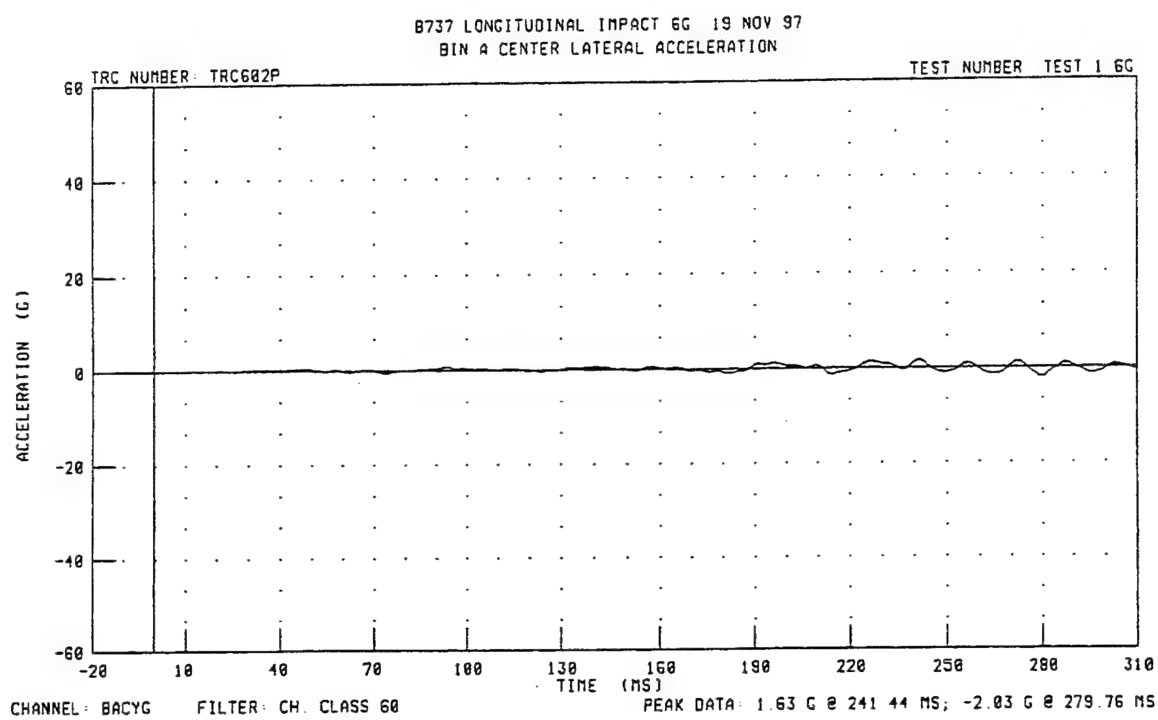


B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN A FRONT VERTICAL ACCELERATION
TRC NUMBER TRC602P
TEST NUMBER TEST 1 6G
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BAFZG FILTER: CH CLASS 60
PEAK DATA 4 35 G @ 277 20 MS, -5 25 G @ 242 40 MS



B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN A FRONT LONGITUDINAL VELOCITY
TRC NUMBER TRC602V
TEST NUMBER TEST 1 6G
VELOCITY (FT/S)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BAFXV FILTER: CH. CLASS 180
PEAK DATA: 0.01 FT/S @ -14.08 MS; -24.56 FT/S @ 213.28 MS


B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN A CENTER LONGITUDINAL ACCELERATION
TRC NUMBER: TRC602P
TEST NUMBER: TEST 1 6G
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BACXG
FILTER: CH CLASS 60
PEAK DATA 3 19 G @ 229 20 MS, -7 03 G @ 97 44 MS


B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN A CENTER LATERAL ACCELERATION
TRC NUMBER: TRC602P
TEST NUMBER TEST 1 6G
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BACYG
FILTER: CH. CLASS 60
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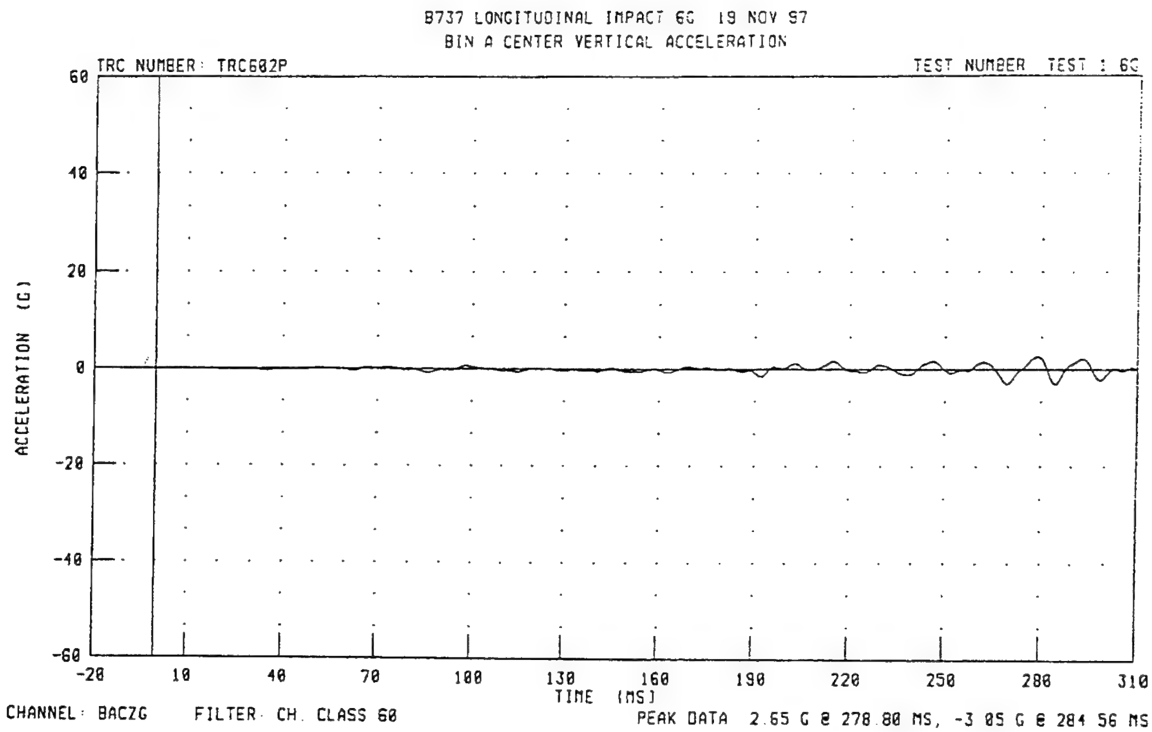
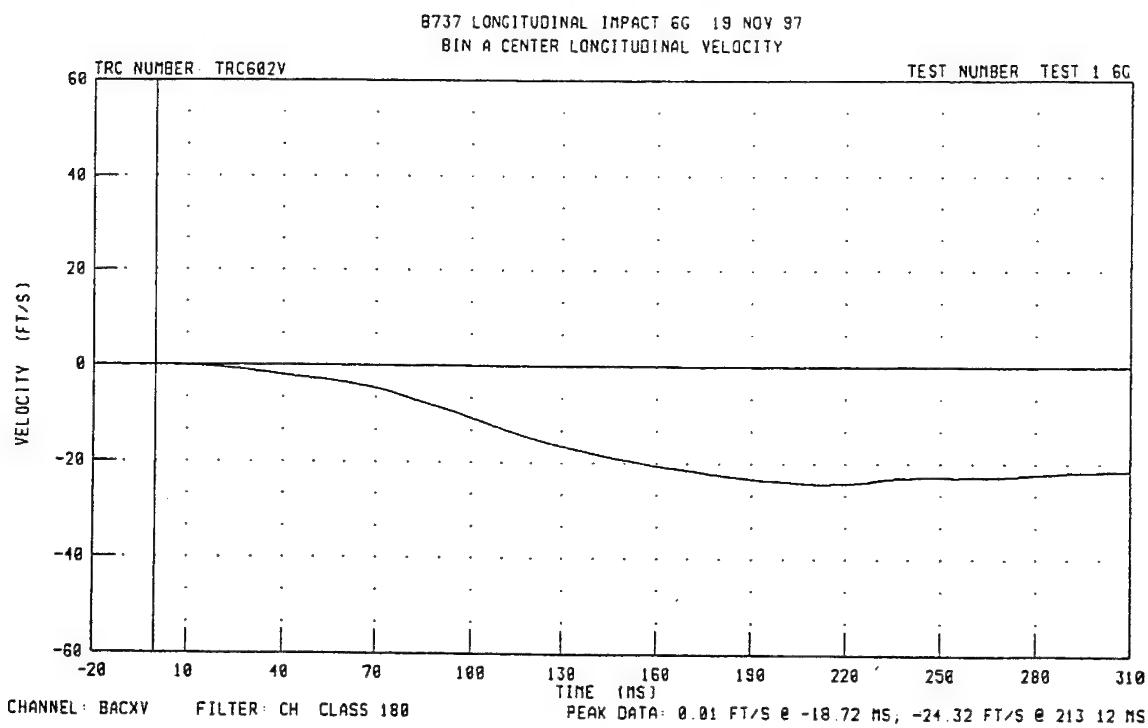
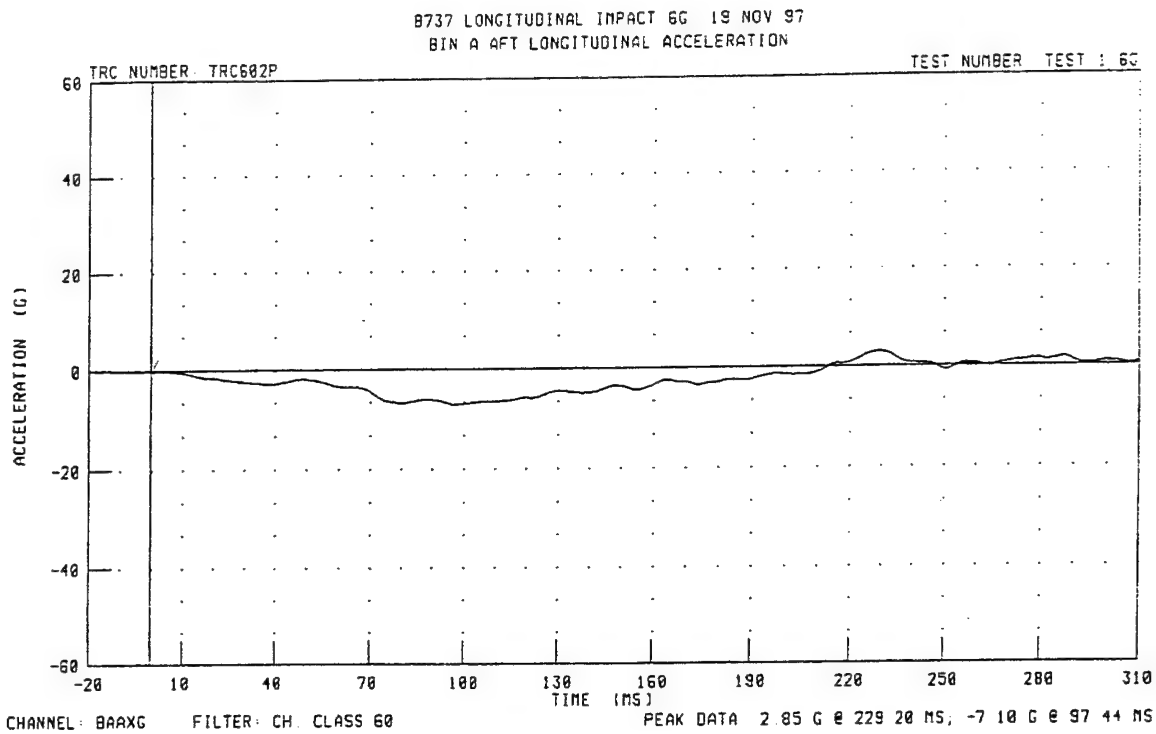
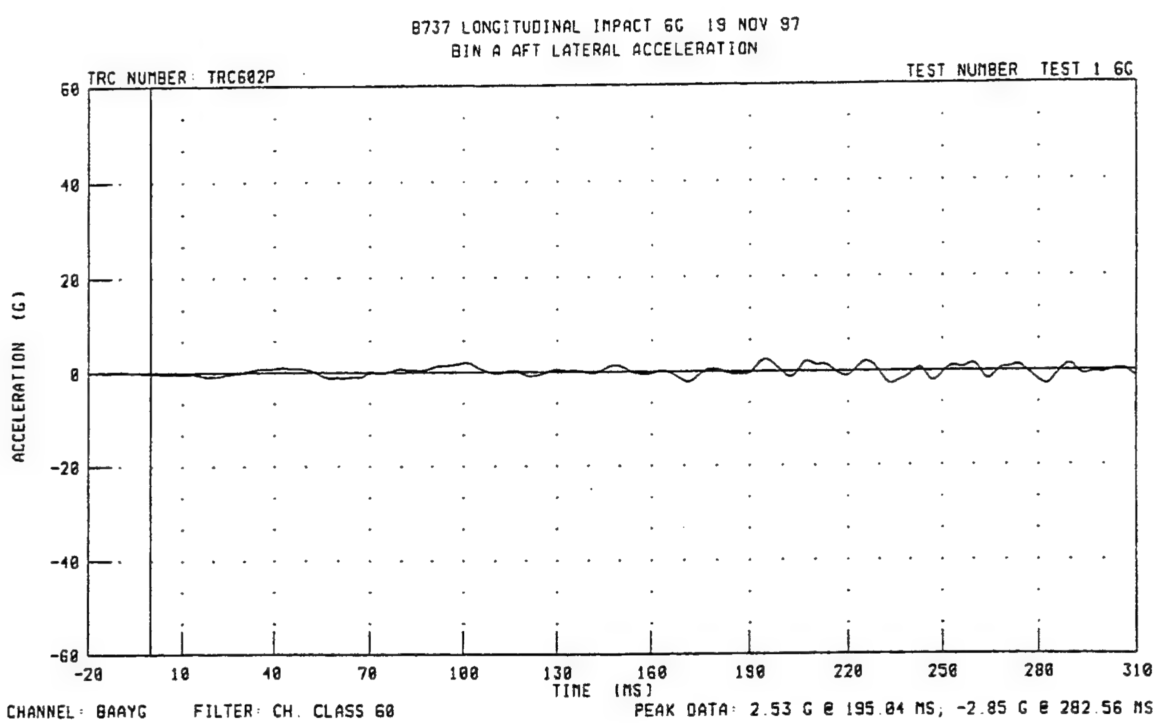


B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN A CENTER VERTICAL ACCELERATION
TRC NUMBER: TRC602P
TEST NUMBER TEST 1 6G
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BACZG
FILTER: CH. CLASS 60
PEAK DATA 2.65 G @ 278.80 MS, -3.05 G @ 284.56 MS



B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN A CENTER LONGITUDINAL VELOCITY
TRC NUMBER TRC602V
TEST NUMBER TEST 1 6G
VELOCITY (FT/S)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BACXV
FILTER: CH CLASS 180
PEAK DATA: 0.01 FT/S @ -18.72 MS, -24.32 FT/S @ 213.12 MS


B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN A AFT LONGITUDINAL ACCELERATION
TRC NUMBER: TRC602P
TEST NUMBER TEST 1 6G
ACCELERATION (G)
TIME (MS)
CHANNEL: BAAXG
FILTER: CH. CLASS 60
PEAK DATA 2.85 G @ 229.20 MS; -7.10 G @ 97.44 MS


B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN A AFT LATERAL ACCELERATION
TRC NUMBER: TRC602P
TEST NUMBER TEST 1 6G
ACCELERATION (G)
TIME (MS)
CHANNEL: BAAYG
FILTER: CH. CLASS 60
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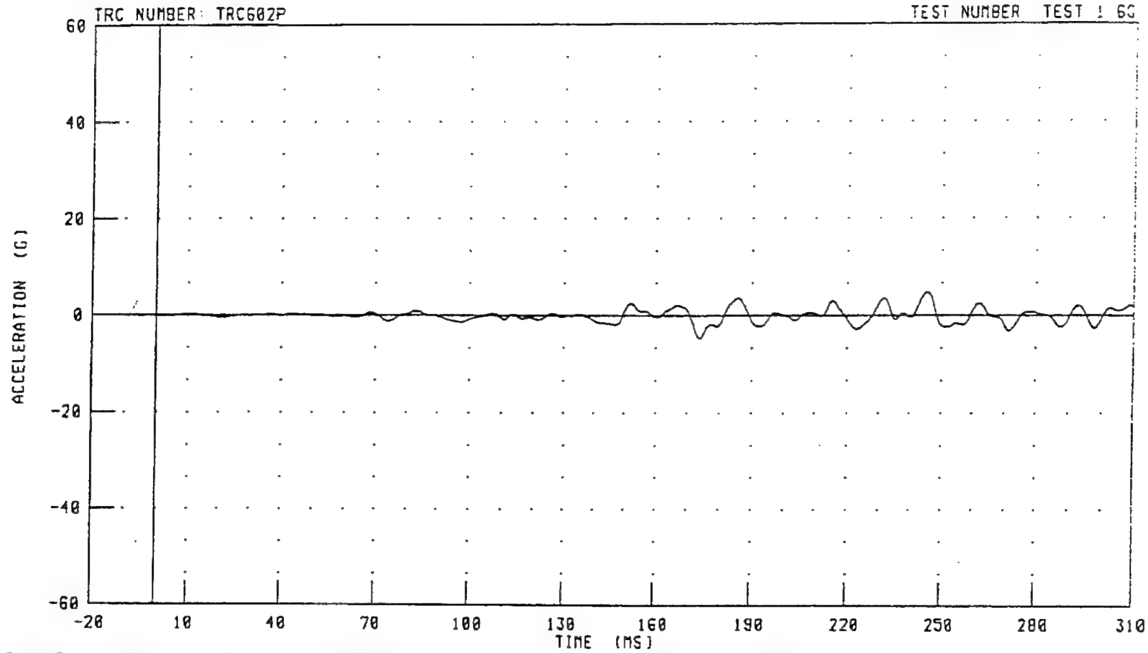
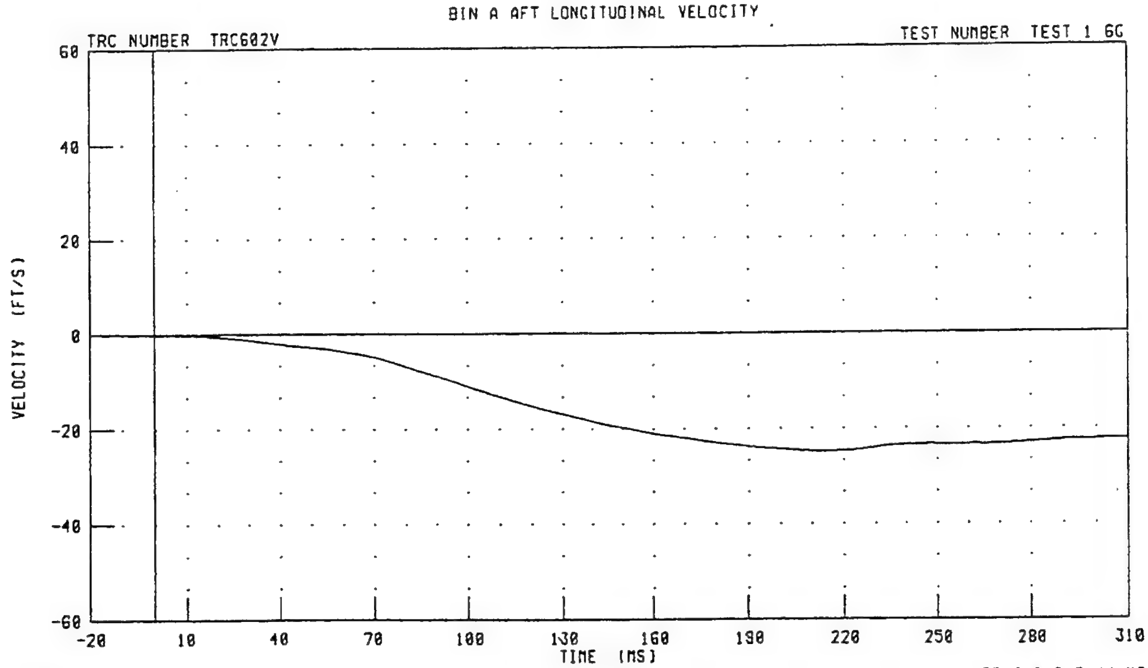
B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN A AFT VERTICAL ACCELERATION

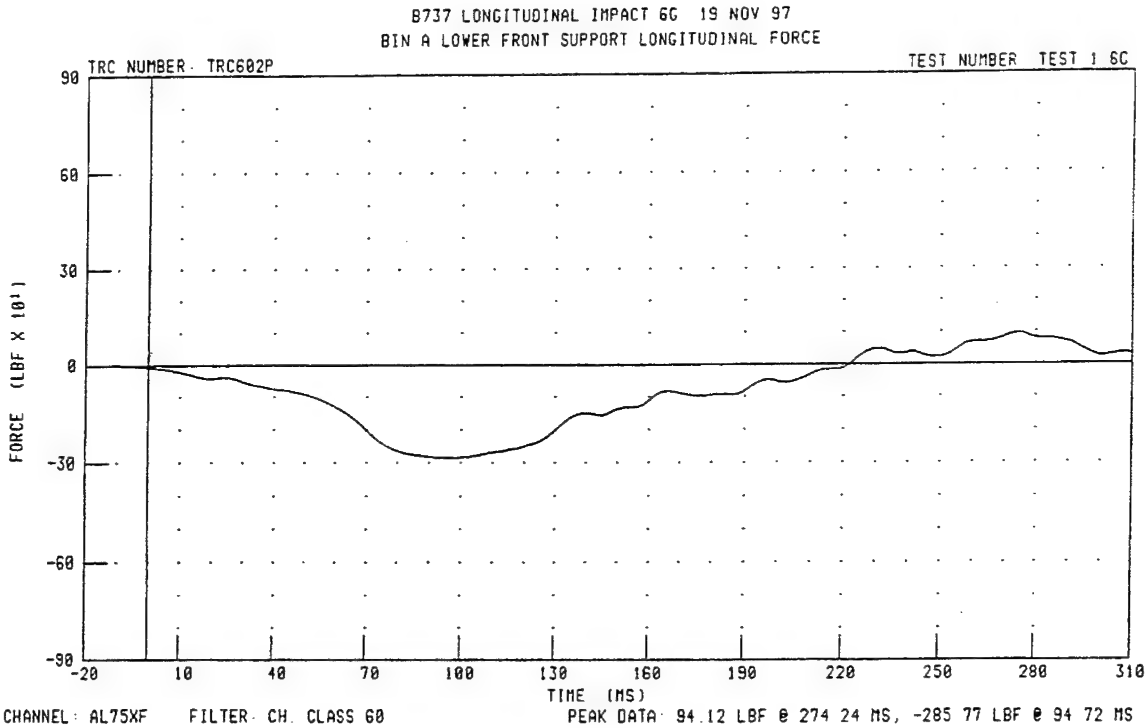


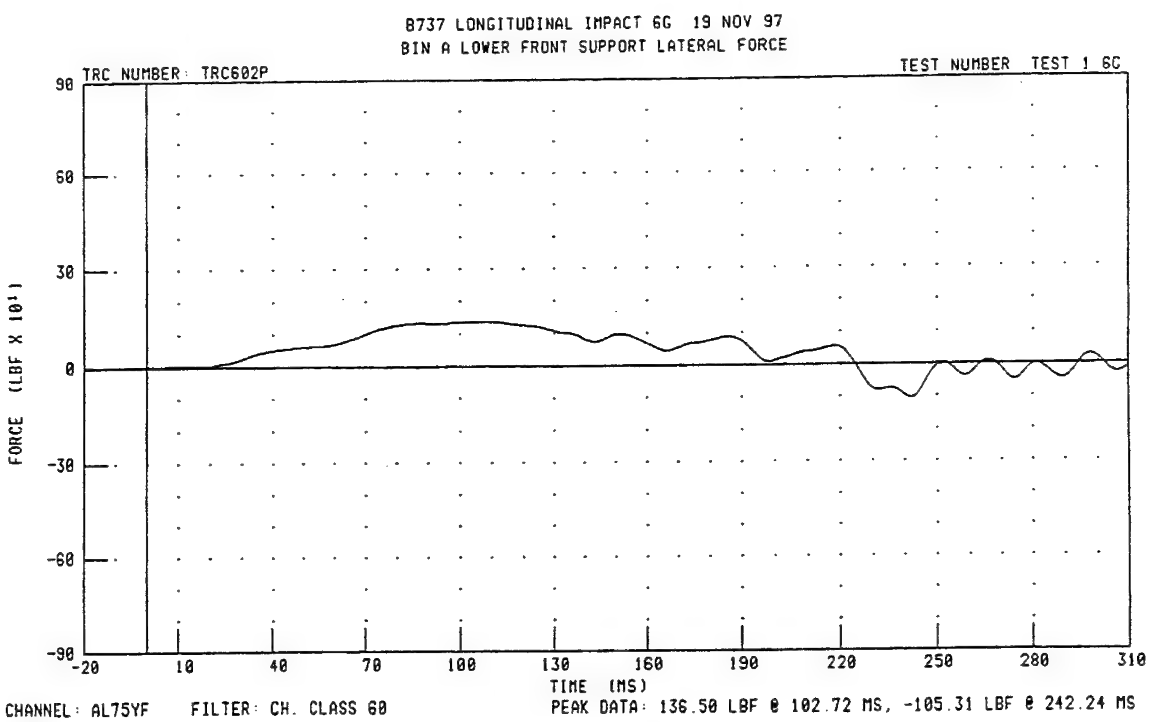
CHANNEL: BAAZG FILTER: CH. CLASS 60 PEAK DATA 4.83 G @ 245.44 MS, -4.72 G @ 174.00 MS

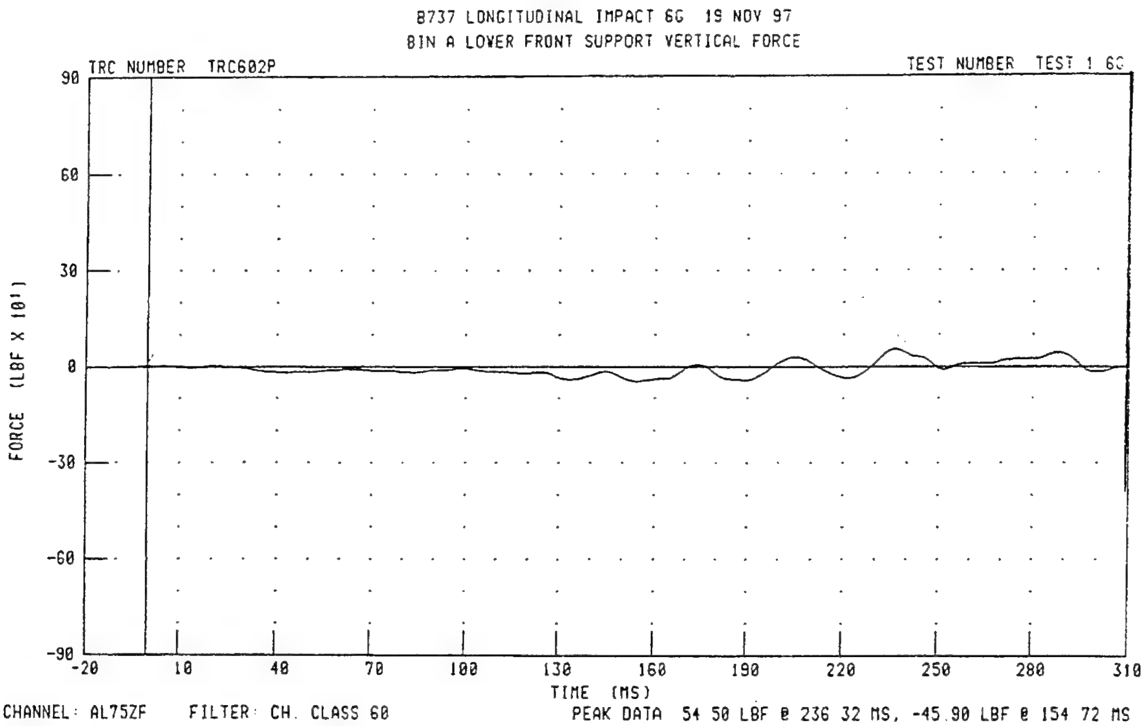
B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN A AFT LONGITUDINAL VELOCITY

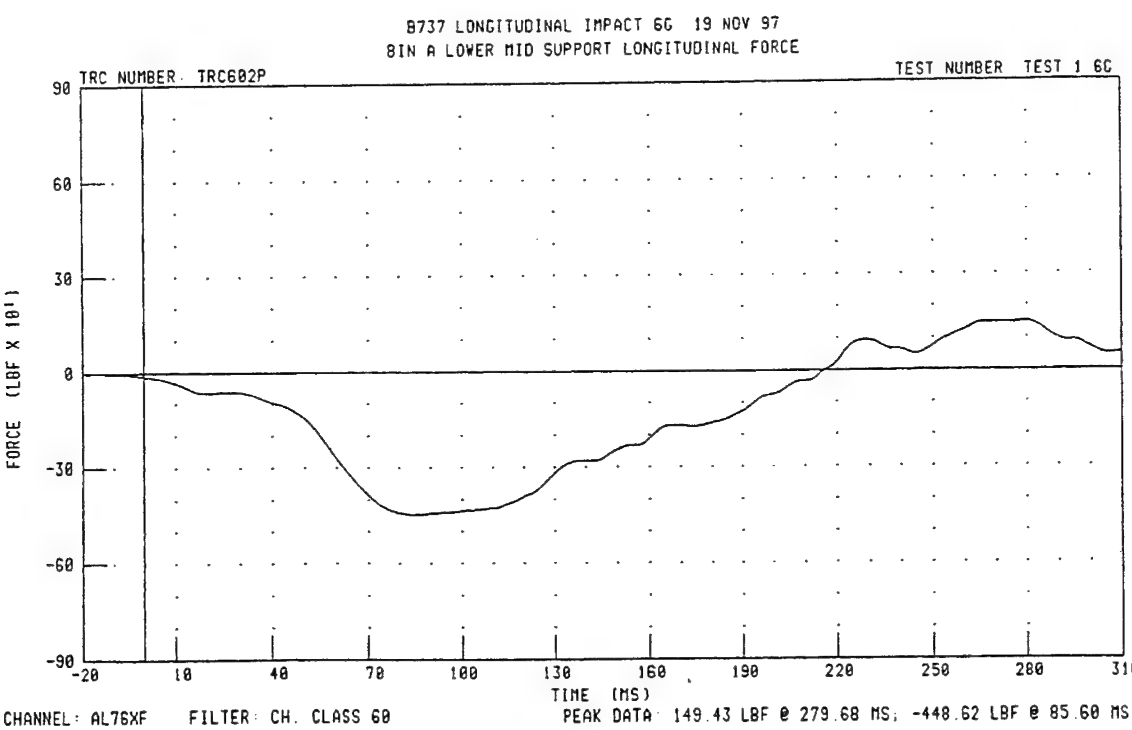


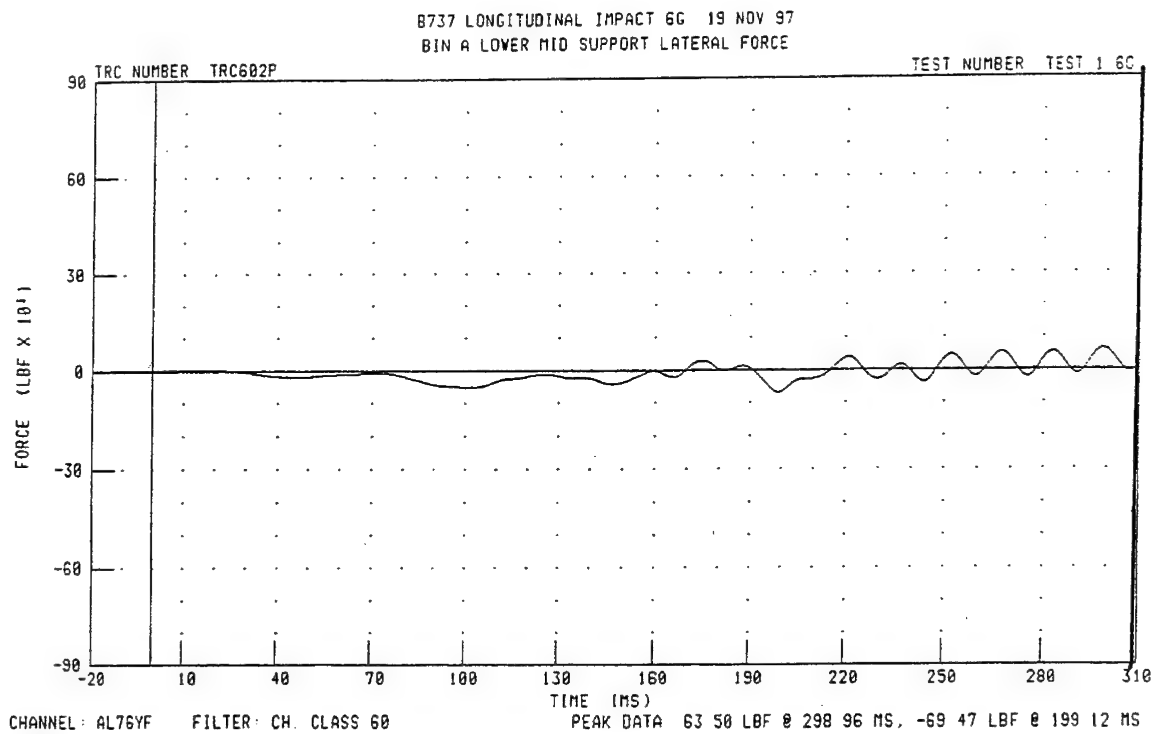
CHANNEL: BAAXV FILTER: CH. CLASS 180 PEAK DATA: -0.03 FT/S @ -20.00 MS; -24.88 FT/S @ 213.44 MS

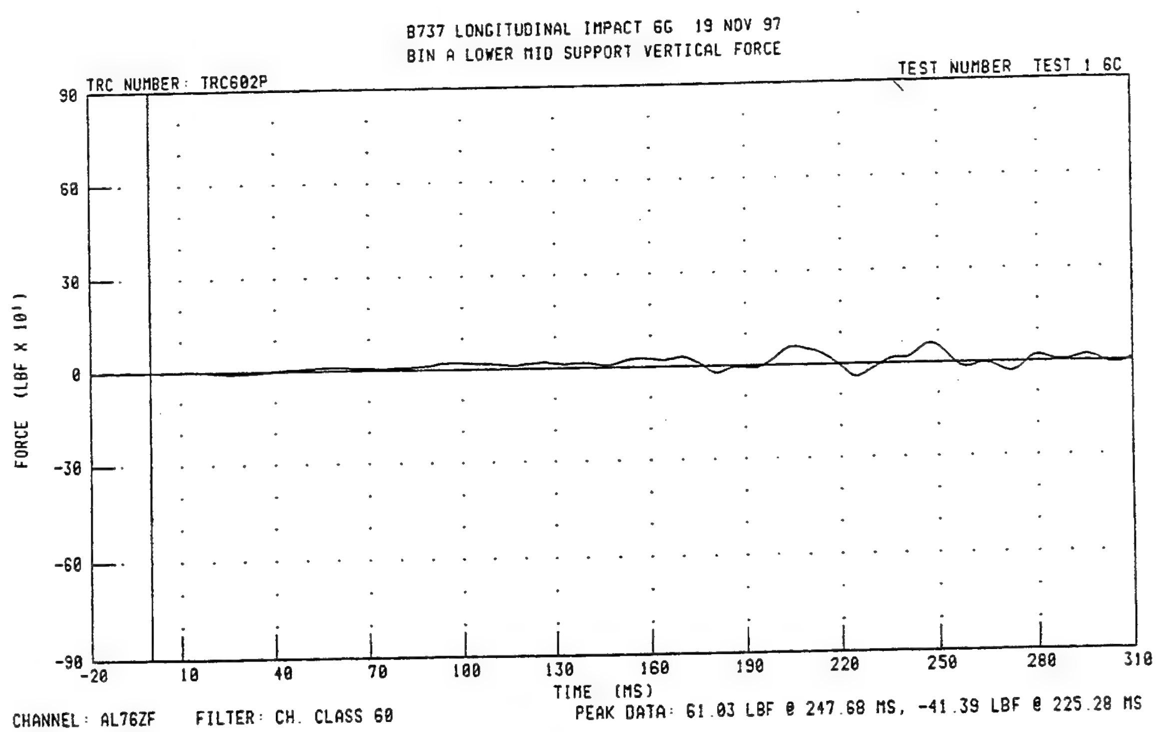

B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN A LOWER FRONT SUPPORT LONGITUDINAL FORCE
TRC NUMBER: TRC602P
TEST NUMBER TEST 1 6C
90
60
30
0
-30
-60
-90
FORCE (LBF X 10¹)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: AL75XF FILTER: CH. CLASS 60
PEAK DATA: 94.12 LBF @ 274.24 MS, -285.77 LBF @ 94.72 MS


B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN A LOWER FRONT SUPPORT LATERAL FORCE
TRC NUMBER: TRC602P
TEST NUMBER TEST 1 6C
90
60
30
0
-30
-60
-90
FORCE (LBF X 10¹)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: AL75YF FILTER: CH. CLASS 60
PEAK DATA: 136.50 LBF @ 102.72 MS, -105.31 LBF @ 242.24 MS

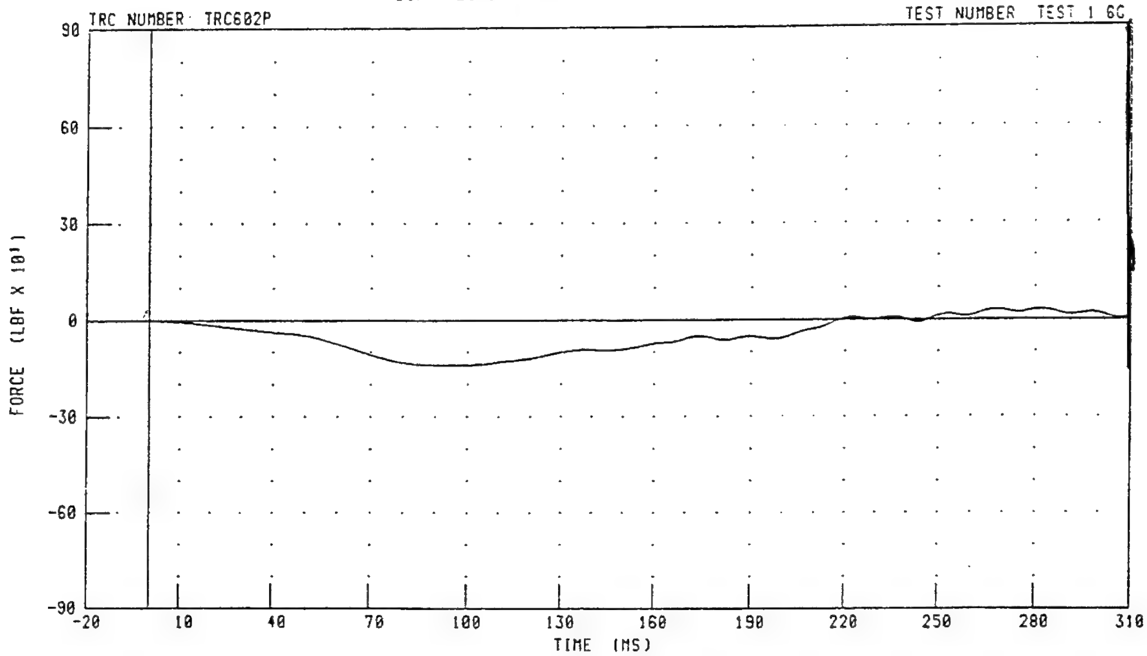

B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN A LOWER FRONT SUPPORT VERTICAL FORCE
TRC NUMBER TRC602P
TEST NUMBER TEST 1 6G
FORCE (LBF X 10¹)
TIME (MS)
CHANNEL: AL75ZF
FILTER: CH. CLASS 60
PEAK DATA 54.50 LBF @ 236.32 MS, -45.90 LBF @ 154.72 MS


B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN A LOWER MID SUPPORT LONGITUDINAL FORCE
TRC NUMBER TRC602P
TEST NUMBER TEST 1 6G
FORCE (LBF X 10¹)
TIME (MS)
CHANNEL: AL76XF
FILTER: CH. CLASS 60
PEAK DATA 149.43 LBF @ 279.68 MS; -448.62 LBF @ 85.60 MS


B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN A LOWER MID SUPPORT LATERAL FORCE
TRC NUMBER TRC602P
TEST NUMBER TEST 1 6G
FORCE (LBF X 10¹)
TIME (MS)
CHANNEL: AL76YF
FILTER: CH. CLASS 60
PEAK DATA 63.50 LBF @ 298.96 MS, -69.47 LBF @ 199.12 MS

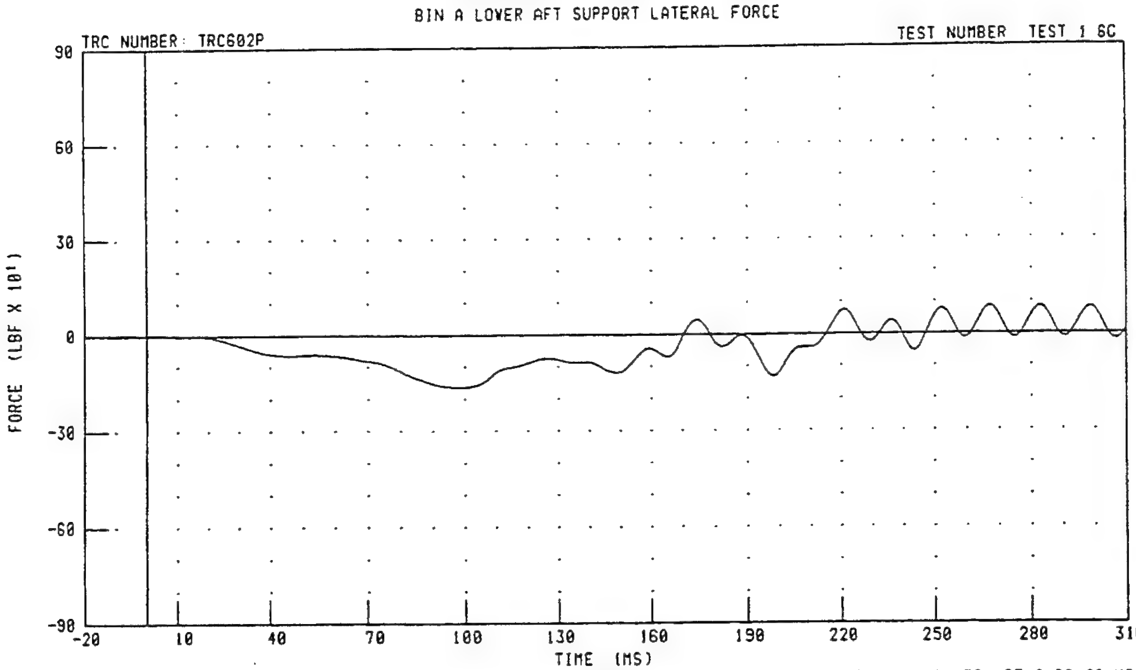

B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN A LOWER MID SUPPORT VERTICAL FORCE
TRC NUMBER: TRC602P
TEST NUMBER TEST 1 6G
FORCE (LBF X 10¹)
TIME (MS)
CHANNEL: AL76ZF
FILTER: CH. CLASS 60
PEAK DATA: 61.03 LBF @ 247.68 MS, -41.39 LBF @ 225.28 MS

B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN A LOWER AFT SUPPORT LONGITUDINAL FORCE

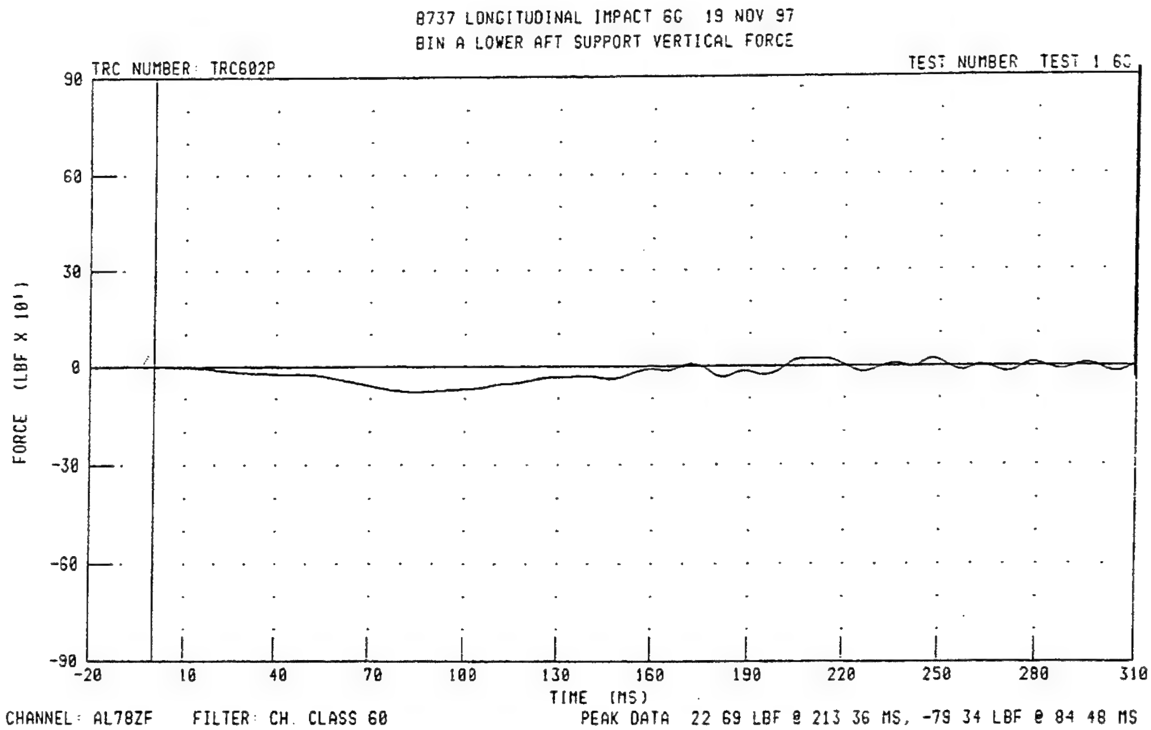


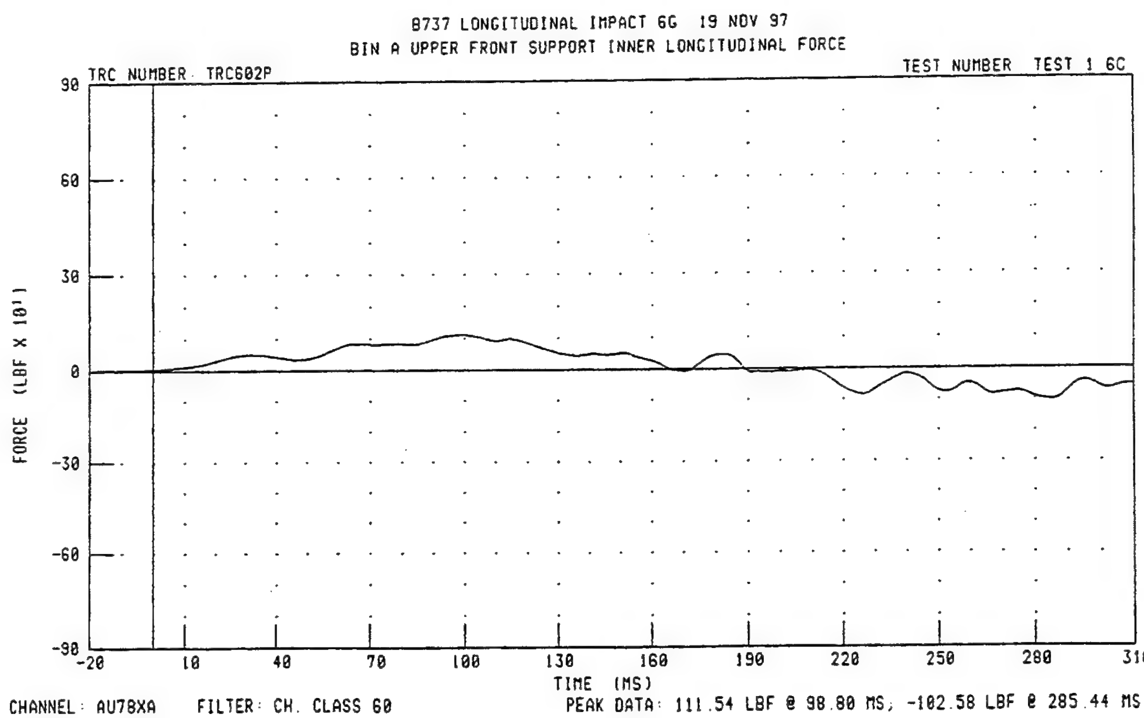
CHANNEL: AL78XF FILTER CH. CLASS 60 PEAK DATA 30 65 LBF @ 282 00 MS, -141.97 LBF @ 95 84 MS

B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN A LOWER AFT SUPPORT LATERAL FORCE

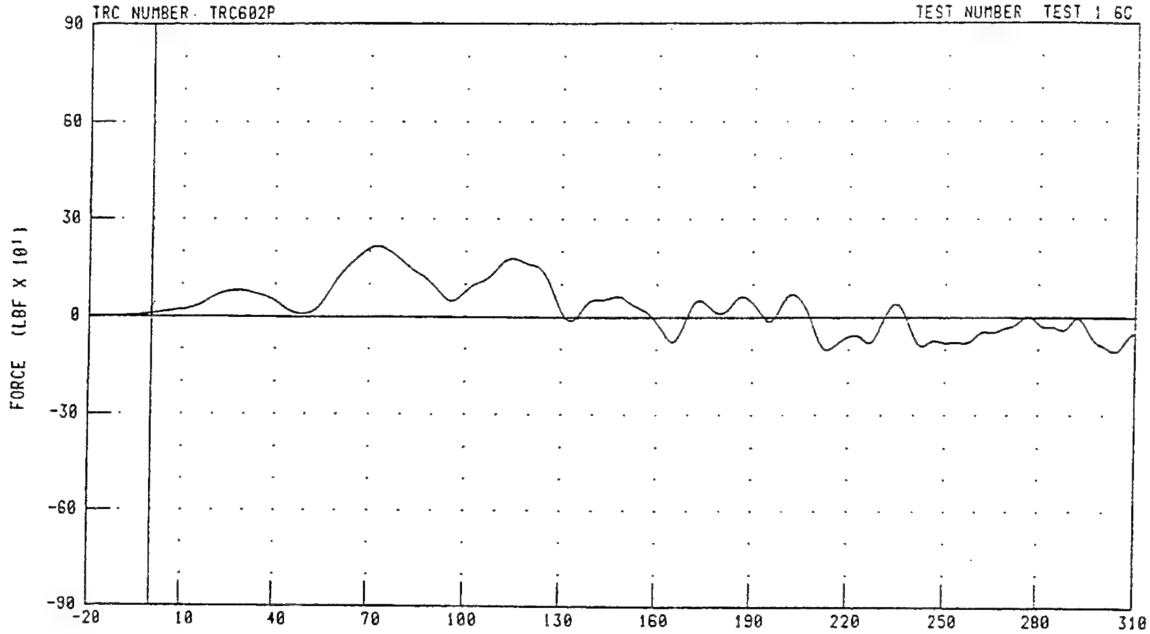


CHANNEL: AL78YF FILTER: CH. CLASS 60 PEAK DATA: 84.10 LBF @ 267.36 MS; -164.39 LBF @ 99.60 MS


B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN A LOWER AFT SUPPORT VERTICAL FORCE
TRC NUMBER: TRC602P
TEST NUMBER TEST 1 6G
FORCE (LBF X 10¹)
TIME (MS)
CHANNEL: AL78ZF
FILTER: CH. CLASS 60
PEAK DATA 22.69 LBF @ 213.36 MS, -79.34 LBF @ 84.48 MS

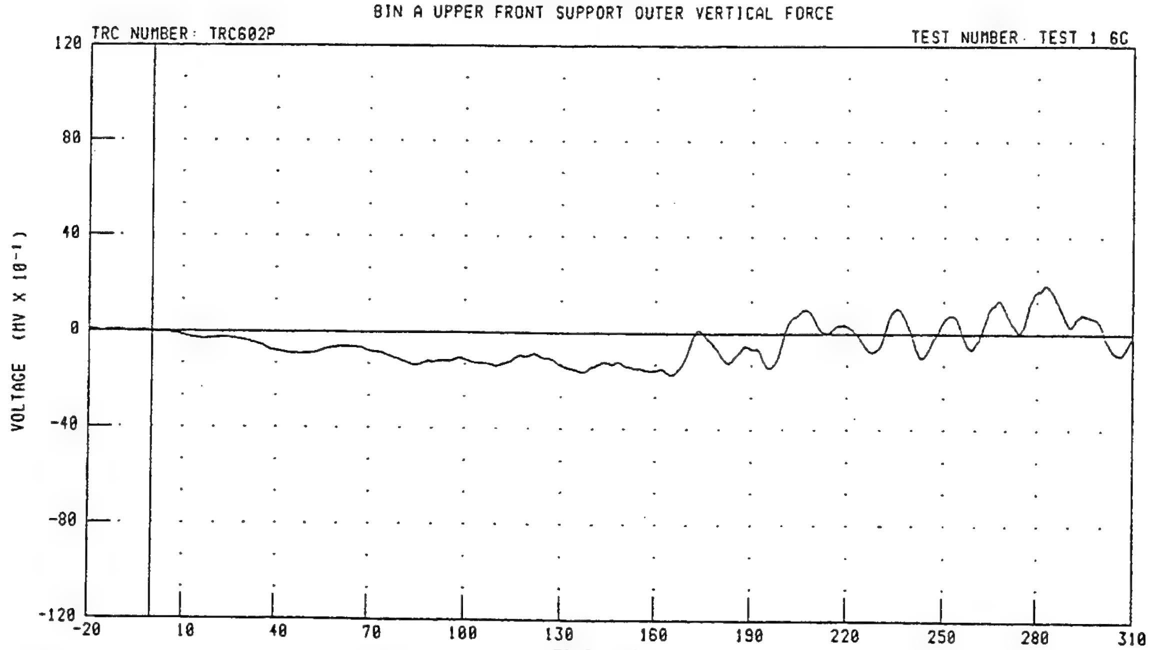

B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN A UPPER FRONT SUPPORT INNER LONGITUDINAL FORCE
TRC NUMBER: TRC602P
TEST NUMBER TEST 1 6G
FORCE (LBF X 10¹)
TIME (MS)
CHANNEL: AU78XA
FILTER: CH. CLASS 60
PEAK DATA: 111.54 LBF @ 98.80 MS, -102.58 LBF @ 285.44 MS

B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN A UPPER FRONT SUPPORT OUTER LONGITUDINAL FORCE

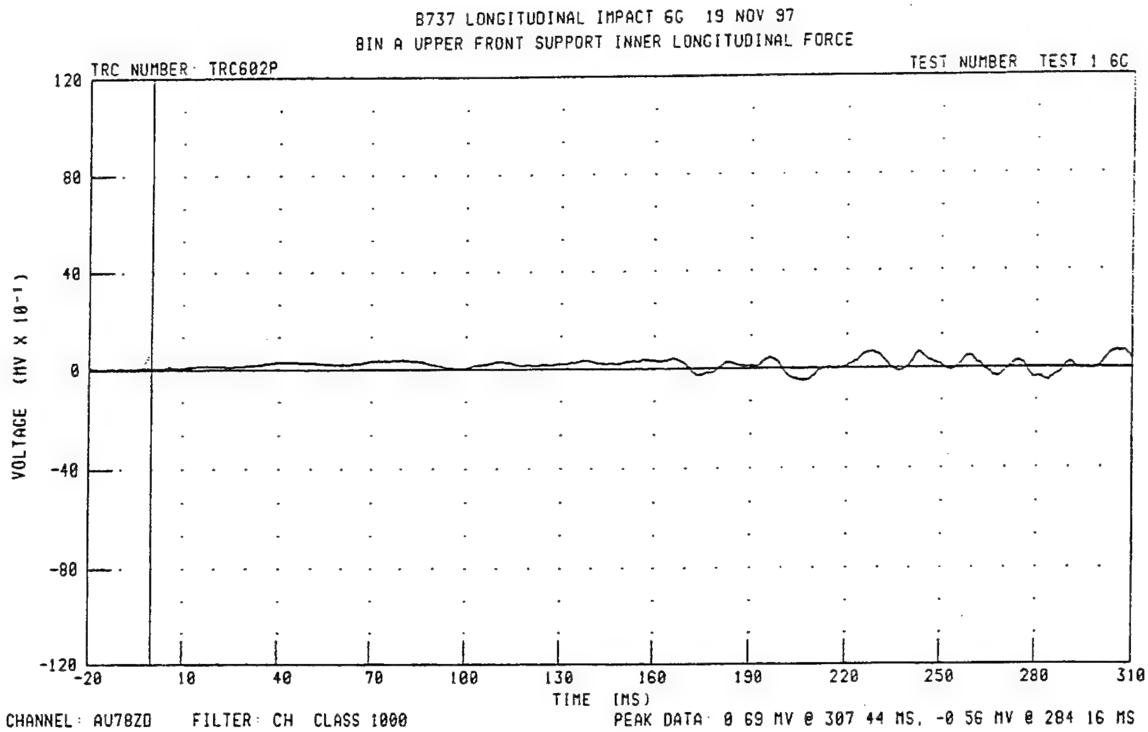


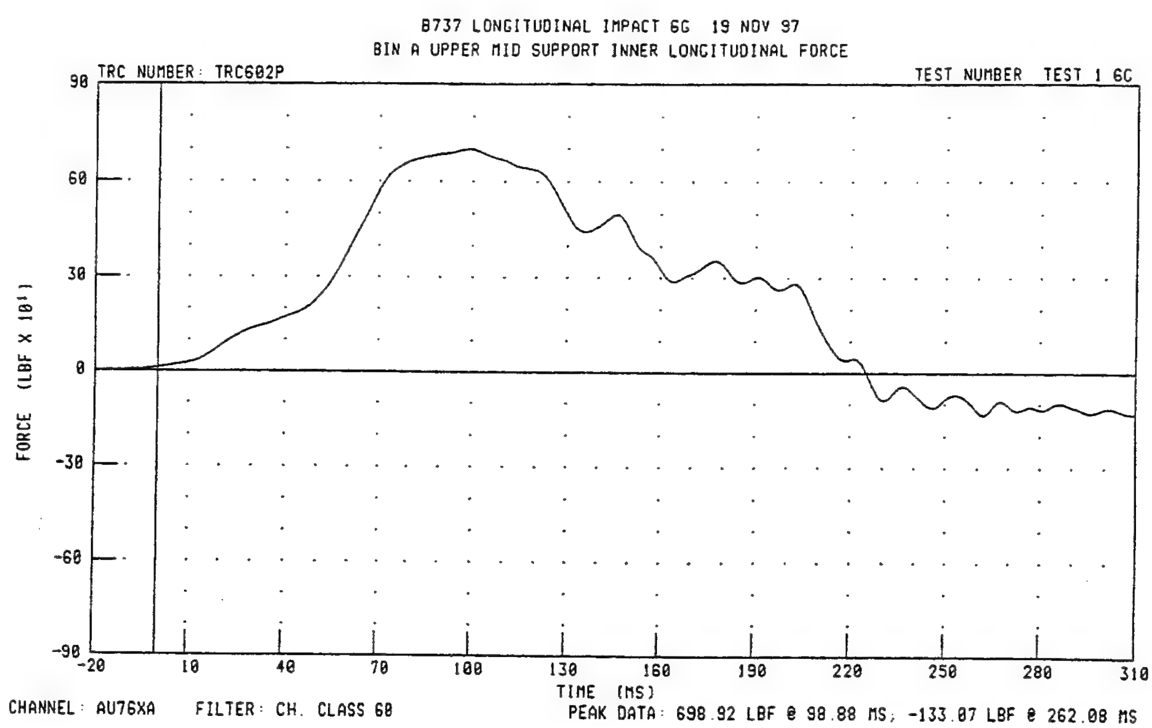
CHANNEL: AU78XB FILTER: CH. CLASS 60 PEAK DATA: 215 81 LBF @ 72.56 MS, -106 00 LBF @ 303.44 MS

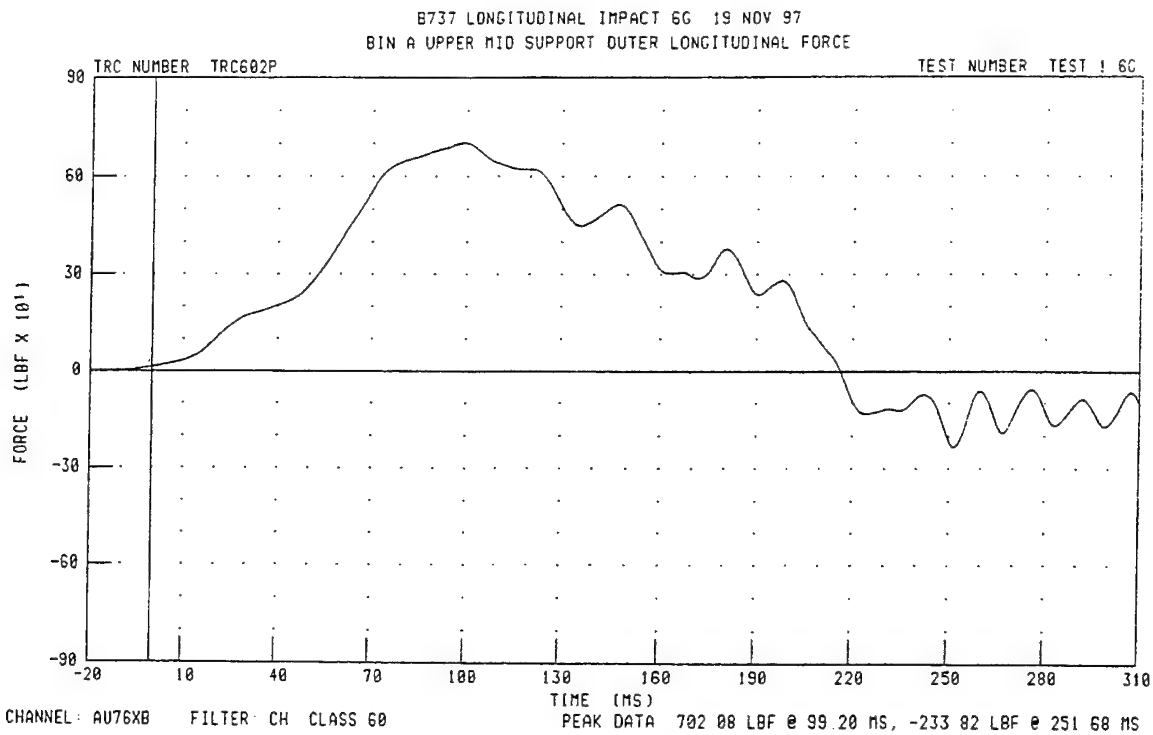
B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN A UPPER FRONT SUPPORT OUTER VERTICAL FORCE

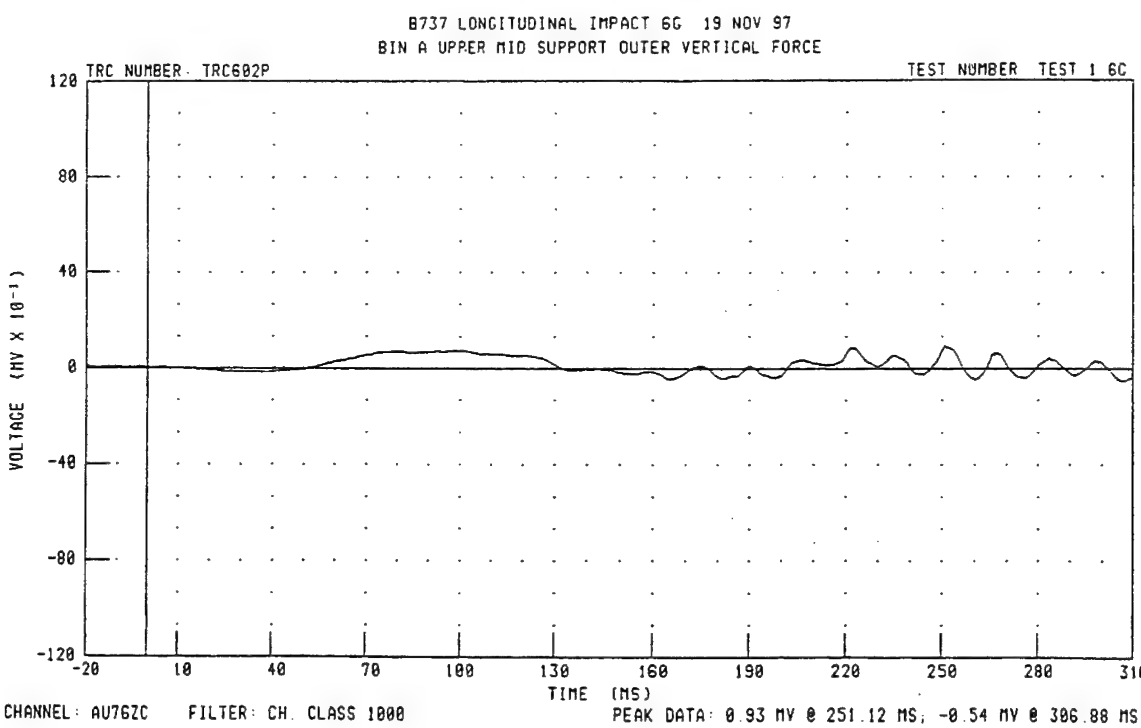


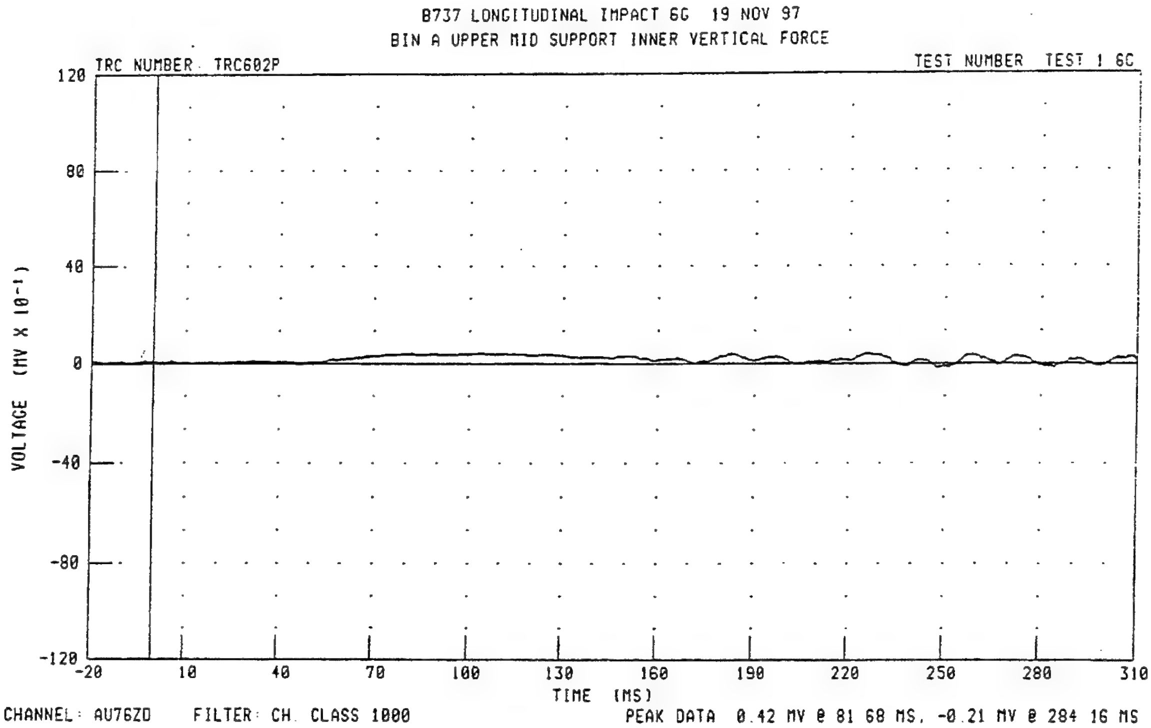
CHANNEL: AU78ZC FILTER: CH. CLASS 1000 PEAK DATA: 2.02 MV @ 282.96 MS; -1.76 MV @ 165.04 MS

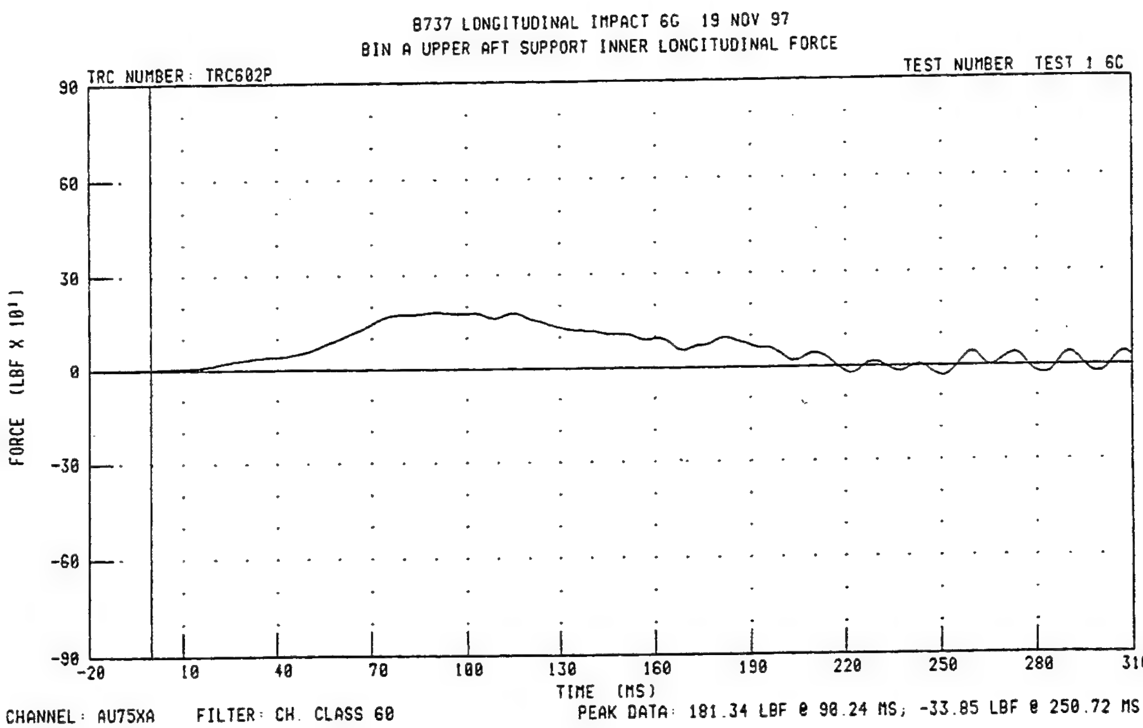

B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN A UPPER FRONT SUPPORT INNER LONGITUDINAL FORCE
TRC NUMBER: TRC602P
TEST NUMBER TEST 1 6G
VOLTAGE (MV X 10⁻¹)
TIME (MS)
CHANNEL: AU78ZD FILTER: CH CLASS 1000
PEAK DATA: 0.69 MV @ 307.44 MS, -0.56 MV @ 284.16 MS


B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN A UPPER MID SUPPORT INNER LONGITUDINAL FORCE
TRC NUMBER: TRC602P
TEST NUMBER TEST 1 6G
FORCE (LBF X 10¹)
TIME (MS)
CHANNEL: AU76XA FILTER: CH. CLASS 60
PEAK DATA: 698.92 LBF @ 98.88 MS; -133.07 LBF @ 262.08 MS

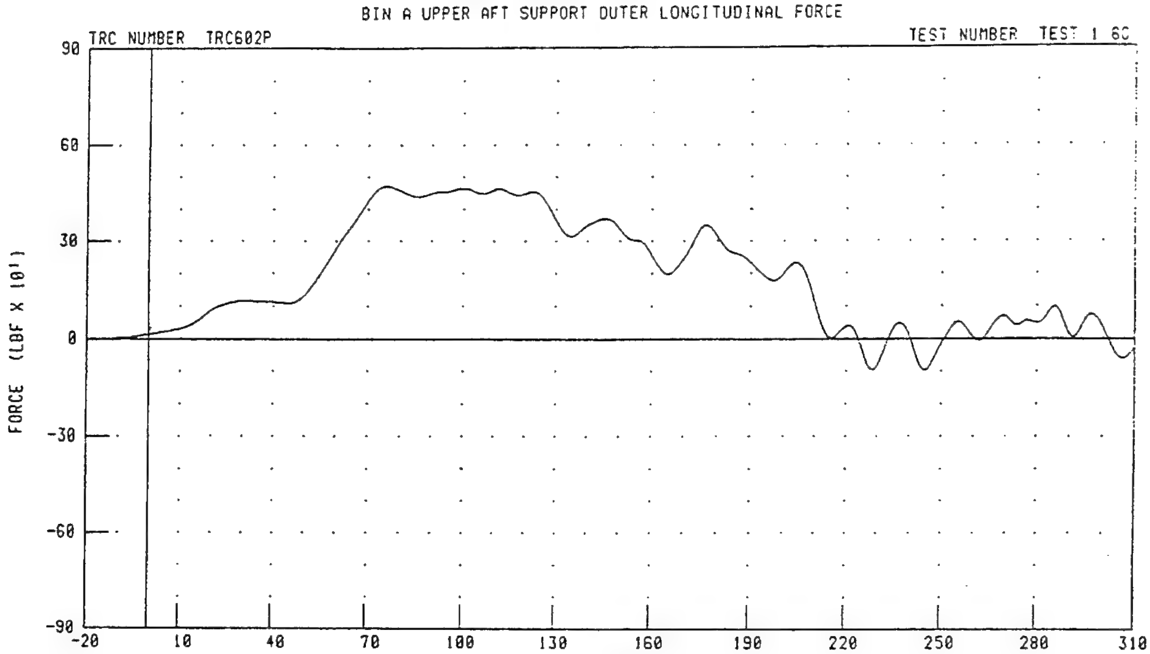

B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN A UPPER MID SUPPORT OUTER LONGITUDINAL FORCE
TRC NUMBER TRC602P
TEST NUMBER TEST 1 6C
FORCE (LBF X 10¹)
90
60
30
0
-30
-60
-90
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: AU76XB
FILTER: CH CLASS 60
PEAK DATA 702 08 LBF @ 99 20 MS, -233 82 LBF @ 251 68 MS


B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN A UPPER MID SUPPORT OUTER VERTICAL FORCE
TRC NUMBER: TRC602P
TEST NUMBER TEST 1 6C
VOLTAGE (MV X 10⁻¹)
120
80
40
0
-40
-80
-120
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: AU76ZC
FILTER: CH. CLASS 1000
PEAK DATA: 0.93 MV @ 251.12 MS; -0.54 MV @ 306.88 MS


B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN A UPPER MID SUPPORT INNER VERTICAL FORCE
TRC NUMBER: TRC602P
TEST NUMBER TEST 1 6C
VOLTAGE (MV X 10⁻¹)
TIME (MS)
CHANNEL: AU76ZD
FILTER: CH. CLASS 1000
PEAK DATA 0.42 MV @ 81.68 MS, -0.21 MV @ 284.16 MS

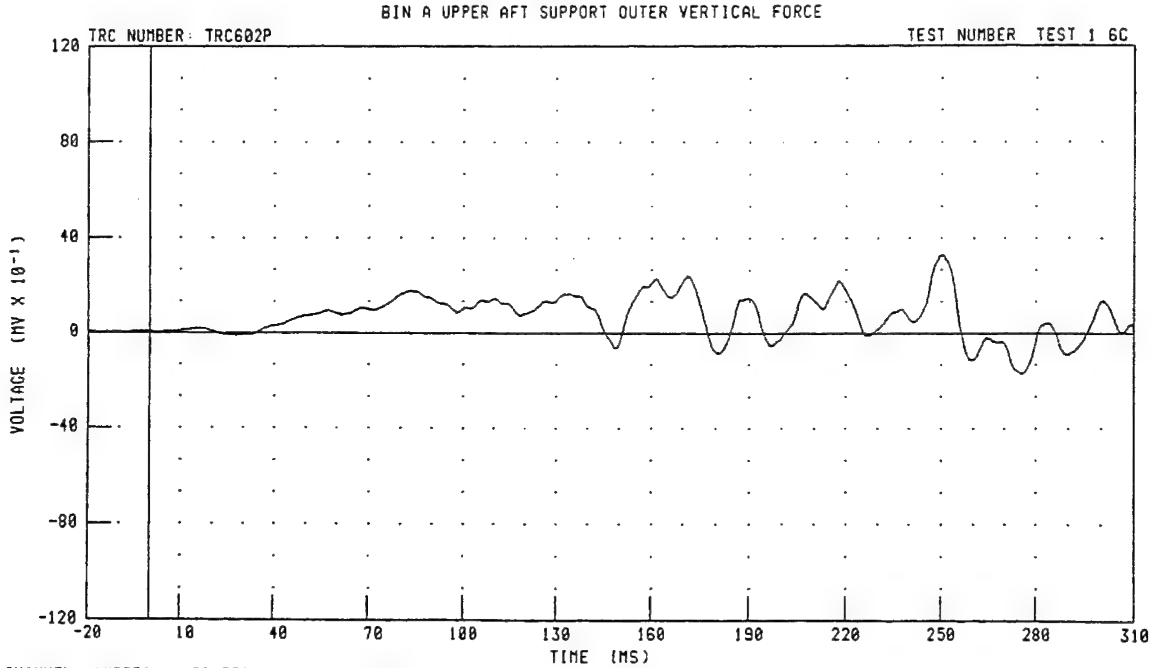

B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN A UPPER AFT SUPPORT INNER LONGITUDINAL FORCE
TRC NUMBER: TRC602P
TEST NUMBER TEST 1 6C
FORCE (LBF X 10¹)
TIME (MS)
CHANNEL: AU75XA
FILTER: CH. CLASS 60
PEAK DATA: 181.34 LBF @ 90.24 MS; -33.85 LBF @ 250.72 MS

B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN A UPPER AFT SUPPORT OUTER LONGITUDINAL FORCE

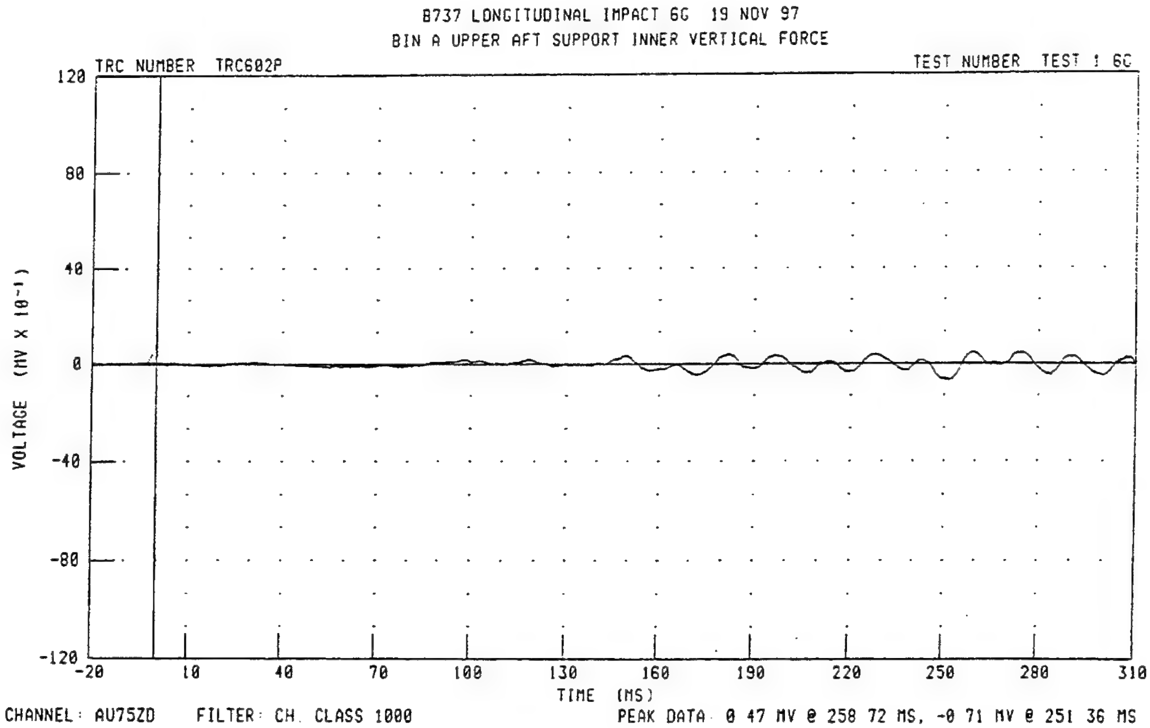


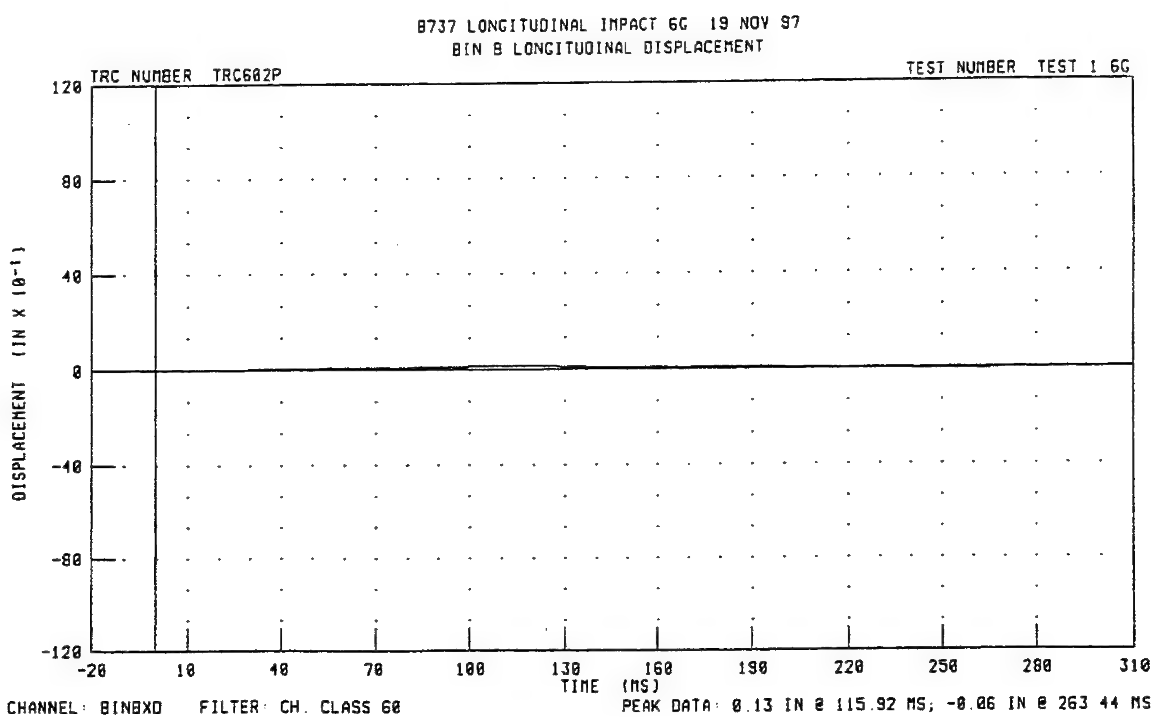
CHANNEL: AU75XB FILTER: CH CLASS 60 PEAK DATA 471 36 LBF @ 75 60 MS, -96 65 LBF @ 244.88 MS

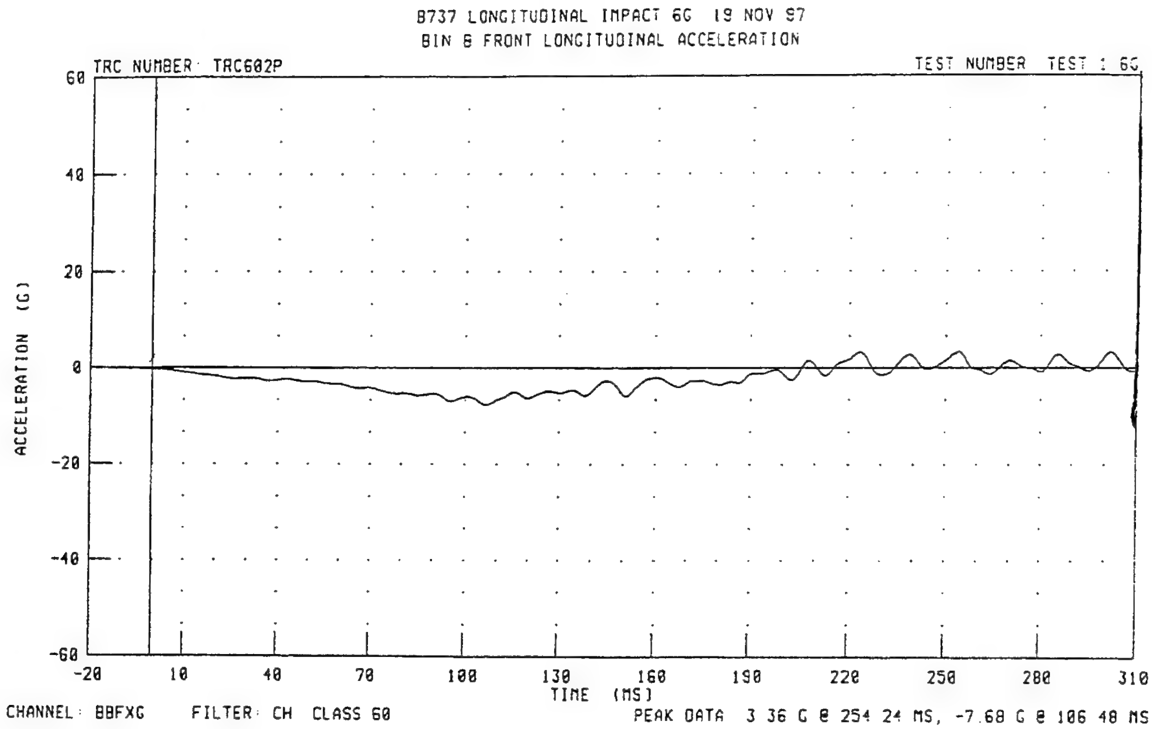
B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN A UPPER AFT SUPPORT OUTER VERTICAL FORCE

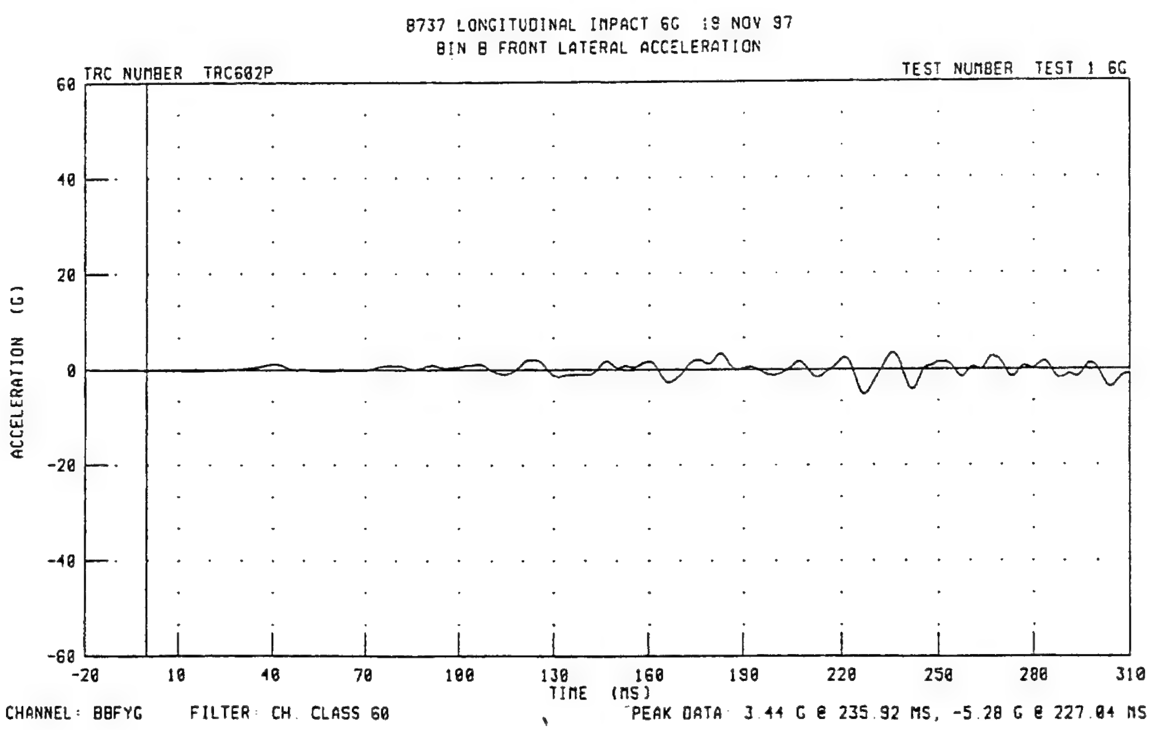


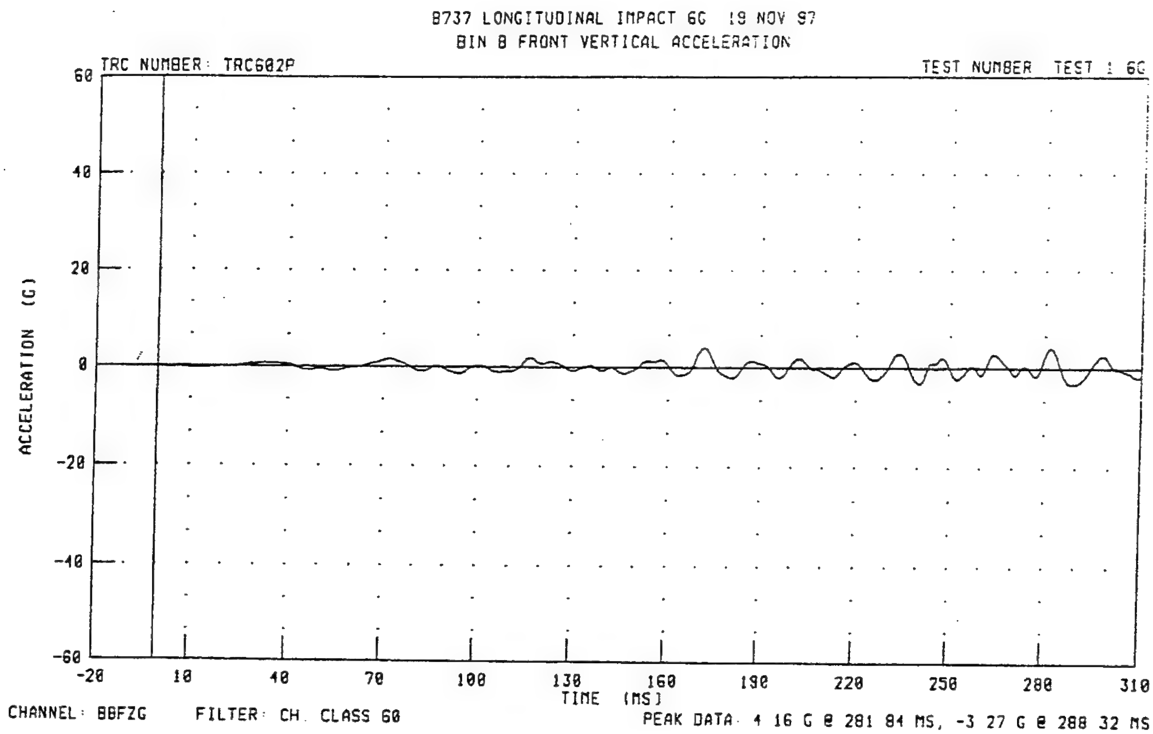
CHANNEL: AU75ZC FILTER: CH. CLASS 1000 PEAK DATA: 3.31 MV @ 250.00 MS; -1.70 MV @ 275.52 MS

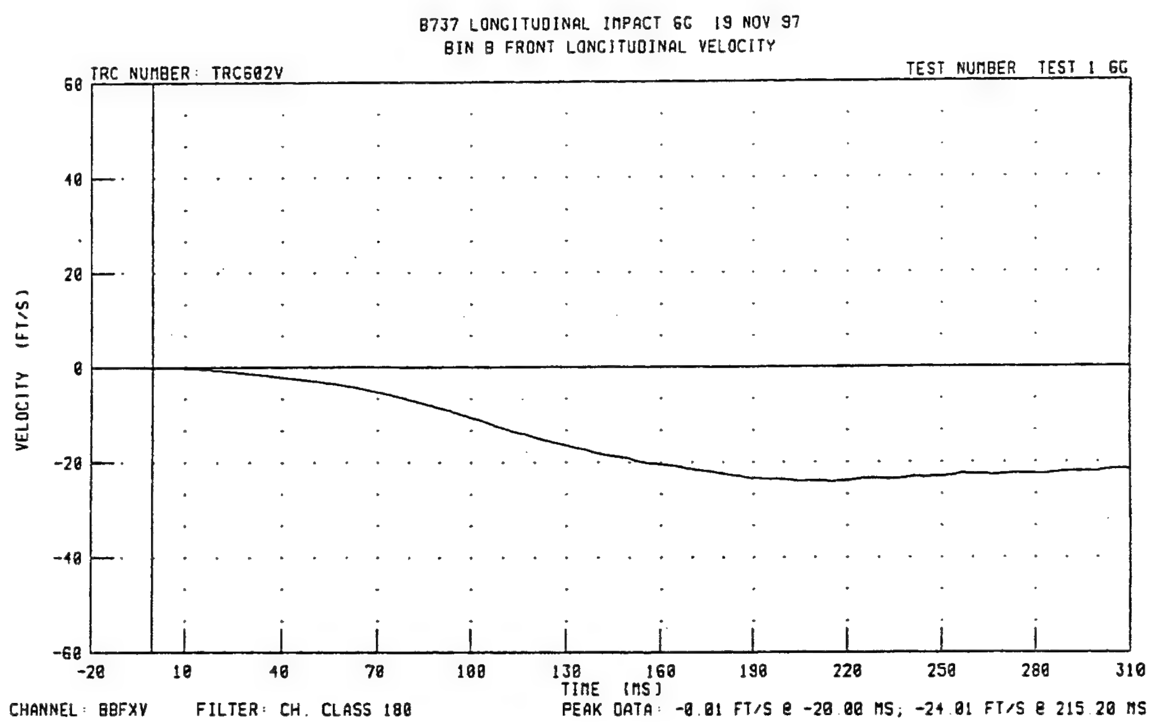

B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN A UPPER AFT SUPPORT INNER VERTICAL FORCE
TRC NUMBER TRC602P
TEST NUMBER TEST 1 6G
VOLTAGE (MV X 10^-1)
120
80
40
0
-40
-80
-120
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: AU75ZD
FILTER: CH. CLASS 1000
PEAK DATA: 0 47 MV @ 258 72 MS, -0 71 MV @ 251 36 MS

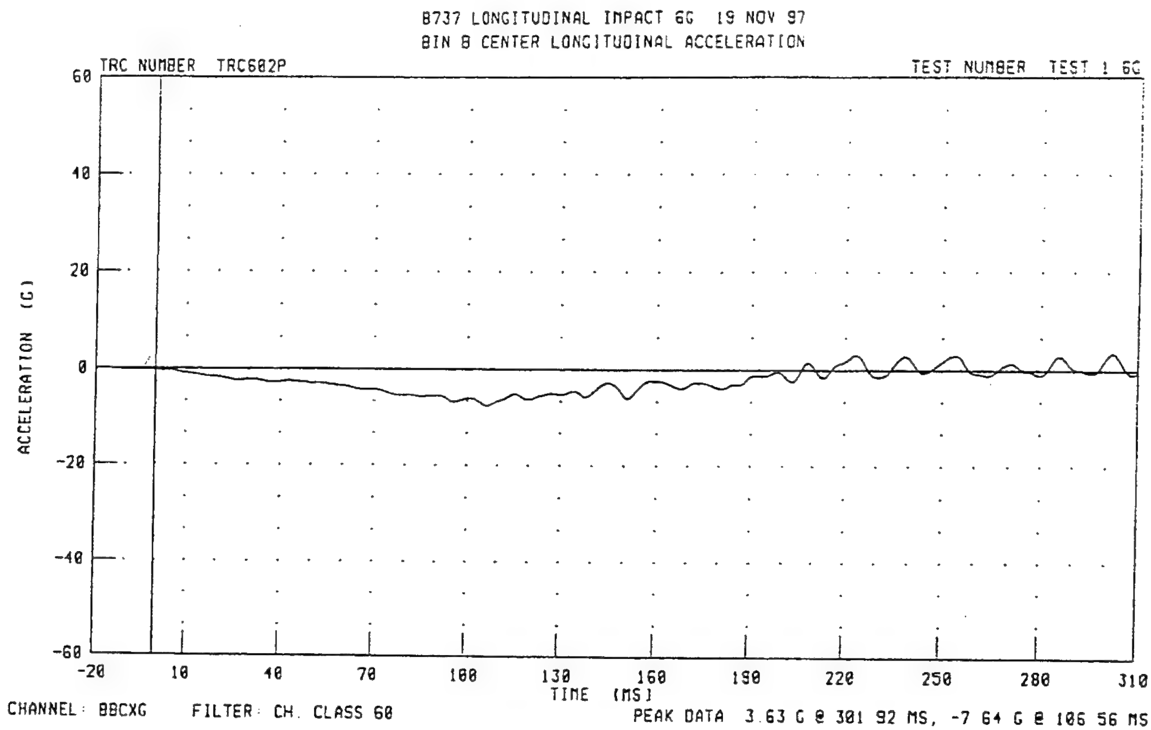

B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN B LONGITUDINAL DISPLACEMENT
TRC NUMBER TRC602P
TEST NUMBER TEST 1 6G
DISPLACEMENT (IN X 10^-1)
120
80
40
0
-40
-80
-120
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BINBXD
FILTER: CH. CLASS 60
PEAK DATA: 0.13 IN @ 115.92 MS; -0.06 IN @ 263 44 MS

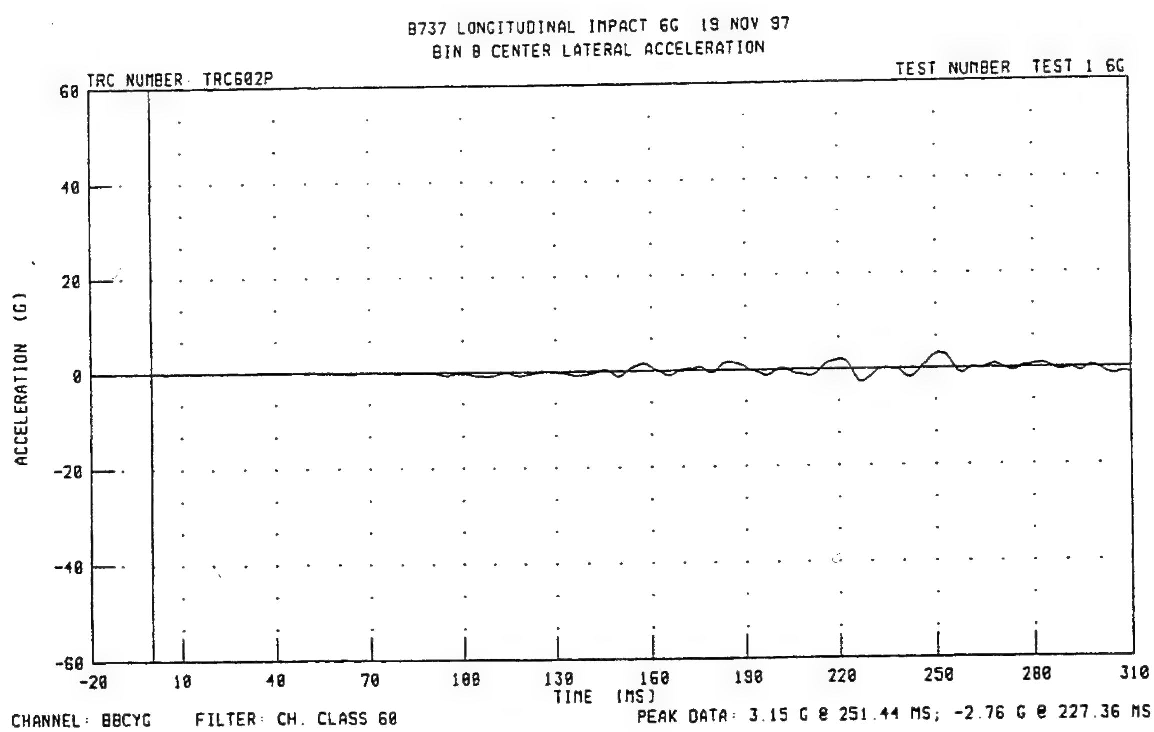

B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN B FRONT LONGITUDINAL ACCELERATION
TRC NUMBER: TRC602P
TEST NUMBER TEST 1 6G
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BBFXG
FILTER: CH CLASS 60
PEAK DATA 3.36 G @ 254.24 MS, -7.68 G @ 106.48 MS

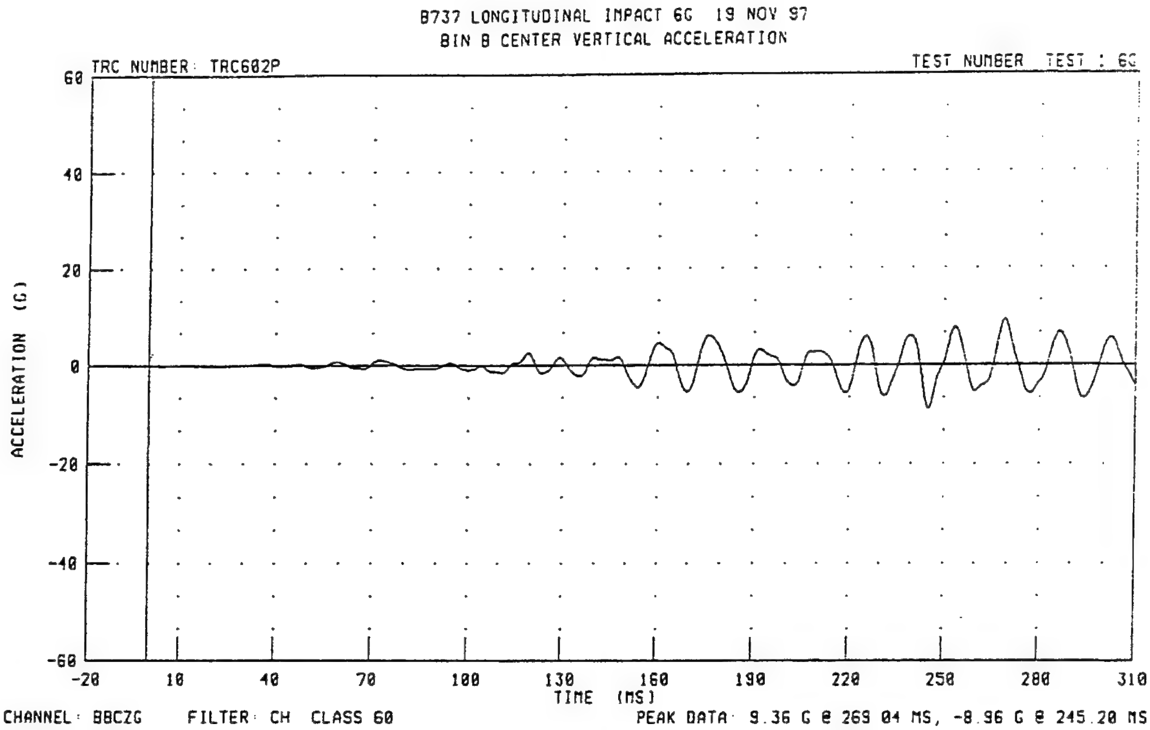

B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN B FRONT LATERAL ACCELERATION
TRC NUMBER TRC602P
TEST NUMBER TEST 1 6G
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BBFYG
FILTER: CH. CLASS 60
PEAK DATA: 3.44 G @ 235.92 MS, -5.28 G @ 227.04 MS


B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN B FRONT VERTICAL ACCELERATION
TRC NUMBER: TRC602P
TEST NUMBER TEST 1 6G
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BBFZG
FILTER: CH. CLASS 60
PEAK DATA: 4 16 G @ 281 84 MS, -3 27 G @ 288 32 MS

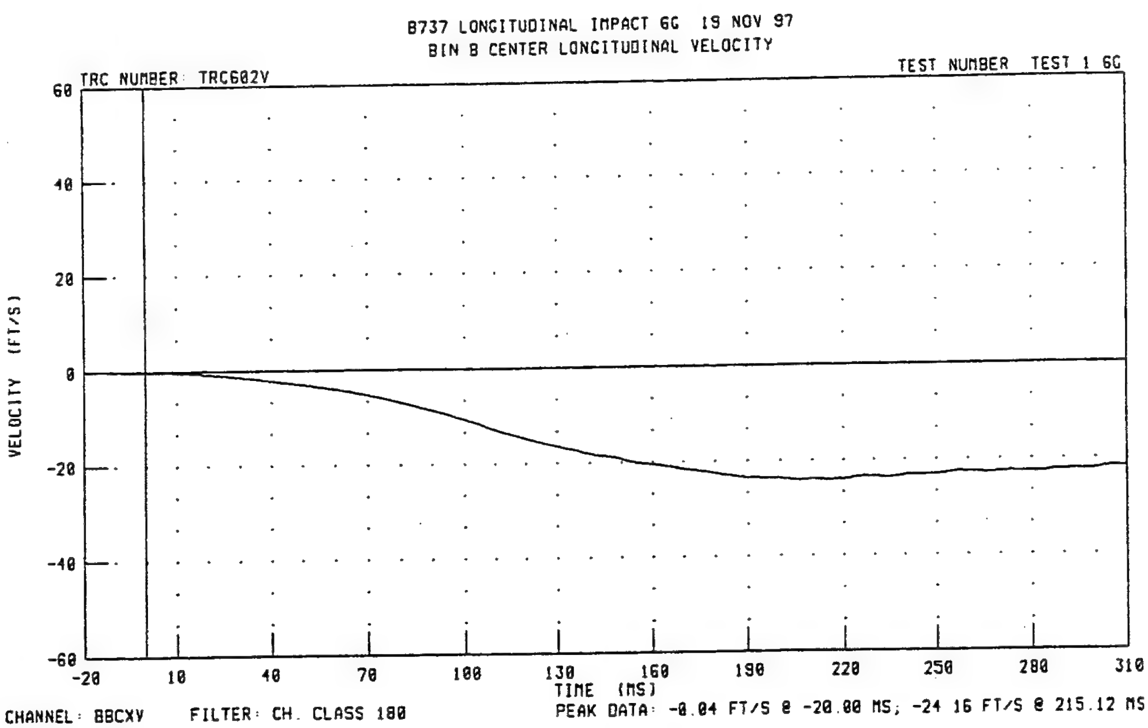

B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN B FRONT LONGITUDINAL VELOCITY
TRC NUMBER: TRC602V
TEST NUMBER TEST 1 6G
VELOCITY (FT/S)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BBFXV
FILTER: CH. CLASS 180
PEAK DATA: -0.01 FT/S @ -20.00 MS; -24.01 FT/S @ 215.20 MS


B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN 8 CENTER LONGITUDINAL ACCELERATION
TRC NUMBER TRC602P
TEST NUMBER TEST 1 6G
60
40
20
0
-20
-40
-60
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: 8BCXG
FILTER: CH. CLASS 60
PEAK DATA 3.63 G @ 301 92 MS, -7 64 G @ 106 56 MS

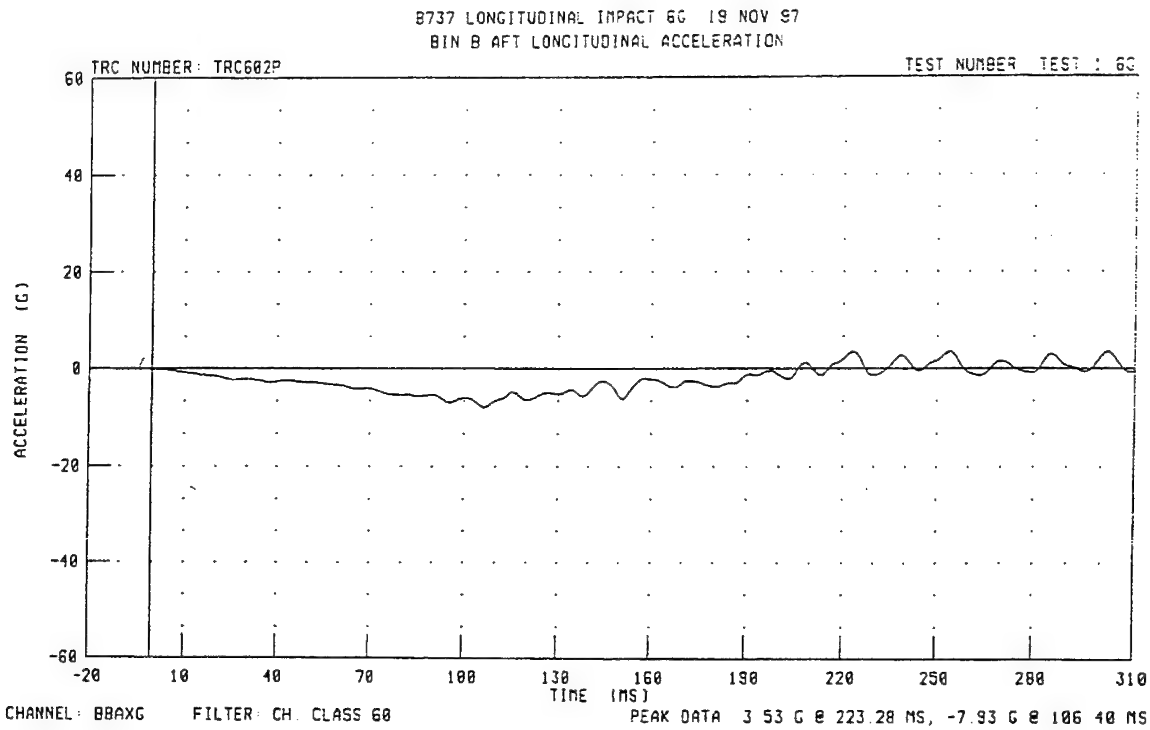

B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN 8 CENTER LATERAL ACCELERATION
TRC NUMBER TRC602P
TEST NUMBER TEST 1 6G
60
40
20
0
-20
-40
-60
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: 8BCYG
FILTER: CH. CLASS 60
PEAK DATA: 3.15 G @ 251.44 MS; -2.76 G @ 227.36 MS

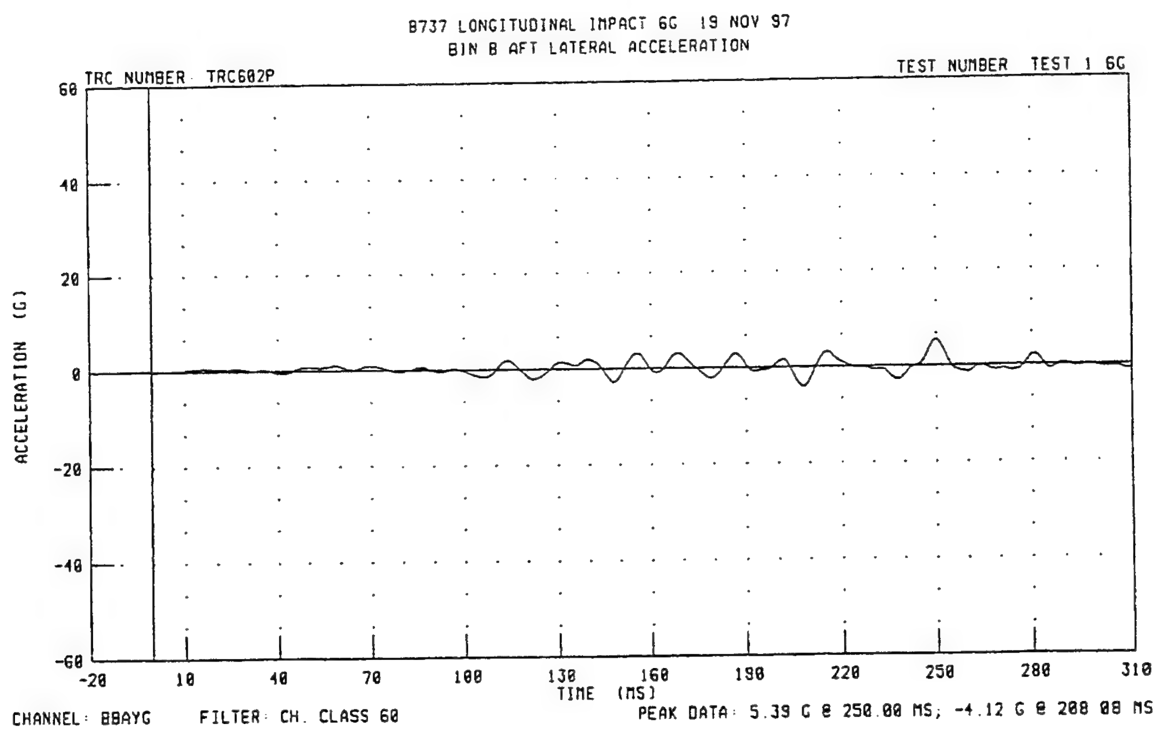


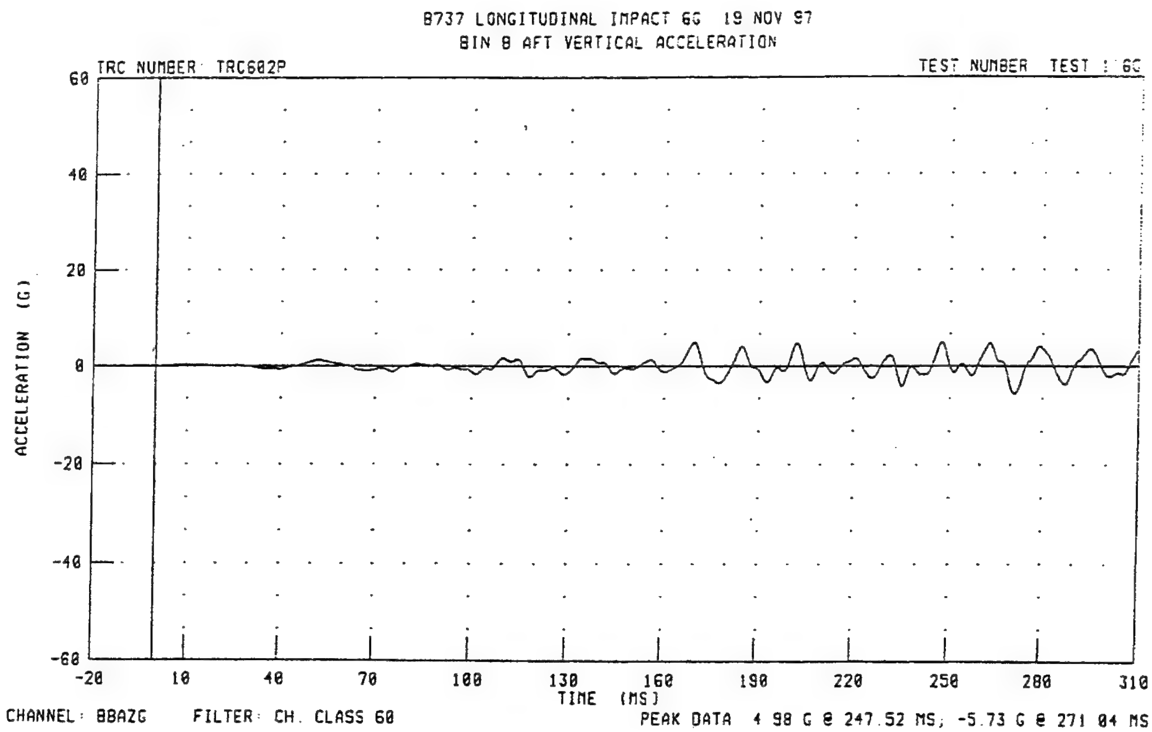
B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN B CENTER VERTICAL ACCELERATION
TRC NUMBER: TRC602P
TEST NUMBER TEST 1 6G
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BBCZG
FILTER: CH CLASS 60
PEAK DATA: 9.36 G @ 269.04 MS, -8.96 G @ 245.20 MS

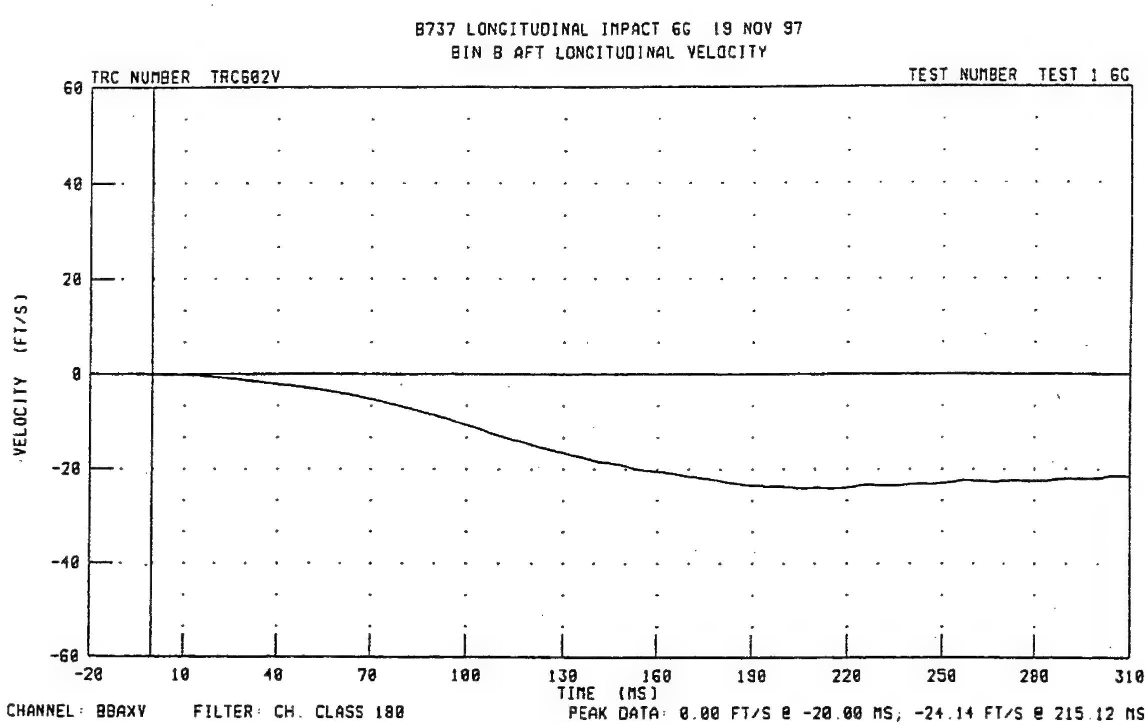


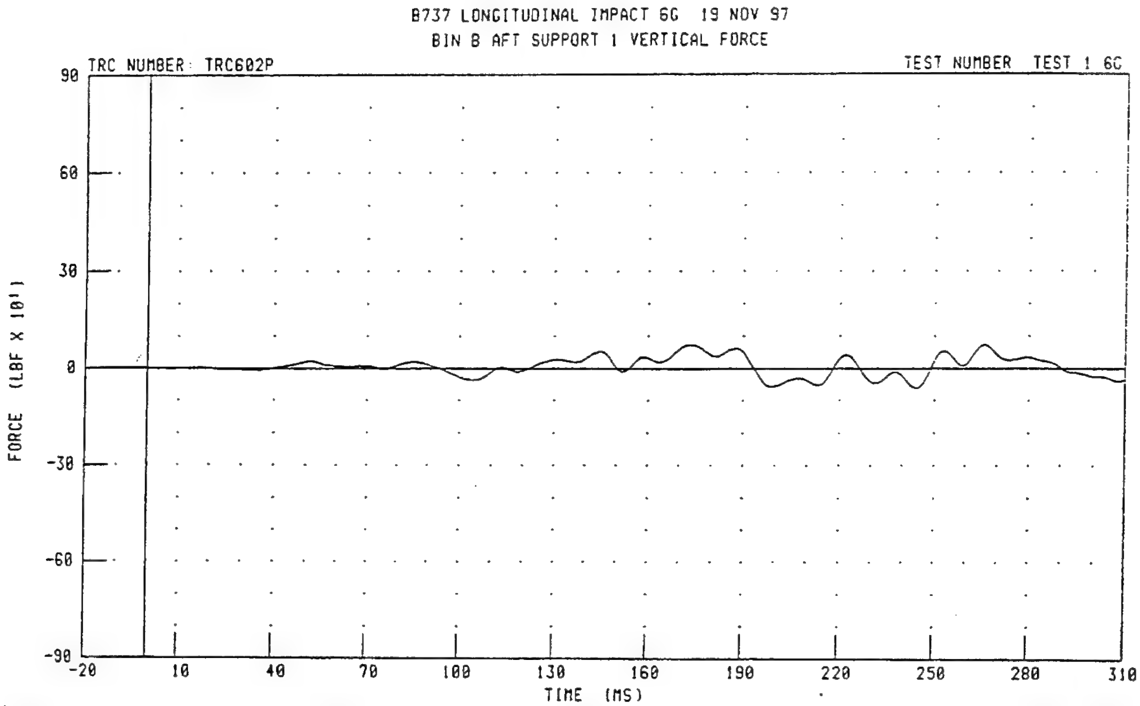
B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN B CENTER LONGITUDINAL VELOCITY
TRC NUMBER: TRC602V
TEST NUMBER TEST 1 6G
VELOCITY (FT/S)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BBCXV
FILTER: CH. CLASS 180
PEAK DATA: -0.04 FT/S @ -20.00 MS; -24.16 FT/S @ 215.12 MS


B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN B AFT LONGITUDINAL ACCELERATION
TRC NUMBER: TRC602P
TEST NUMBER TEST 1 6G
ACCELERATION (G)
TIME (MS)
CHANNEL: BBAXG
FILTER: CH. CLASS 60
PEAK DATA 3 53 G @ 223.28 MS, -7.93 G @ 106 40 MS

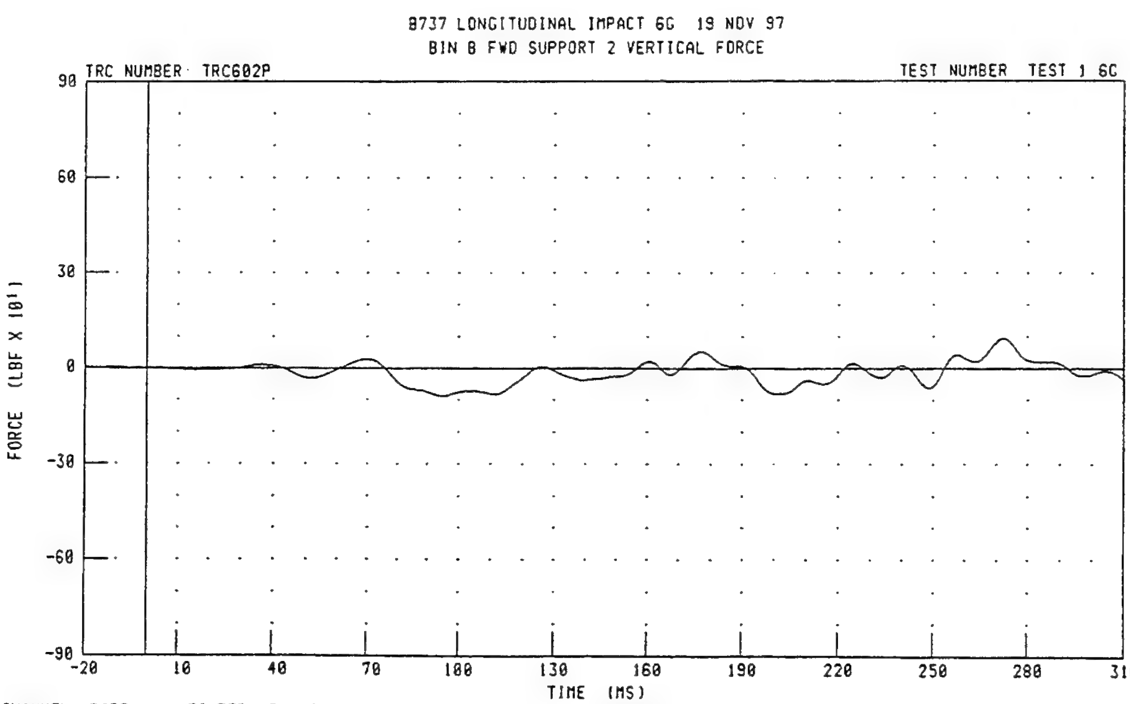

B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN B AFT LATERAL ACCELERATION
TRC NUMBER TRC602P
TEST NUMBER TEST 1 6G
ACCELERATION (G)
TIME (MS)
CHANNEL: BBAYG
FILTER: CH. CLASS 60
PEAK DATA: 5.39 G @ 250.00 MS; -4.12 G @ 208 08 MS


B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN 8 AFT VERTICAL ACCELERATION
TRC NUMBER: TRC602P
TEST NUMBER TEST 1 6G
ACCELERATION (G)
TIME (MS)
CHANNEL: 8BAZG
FILTER: CH. CLASS 60
PEAK DATA 4.98 G @ 247.52 MS; -5.73 G @ 271.04 MS

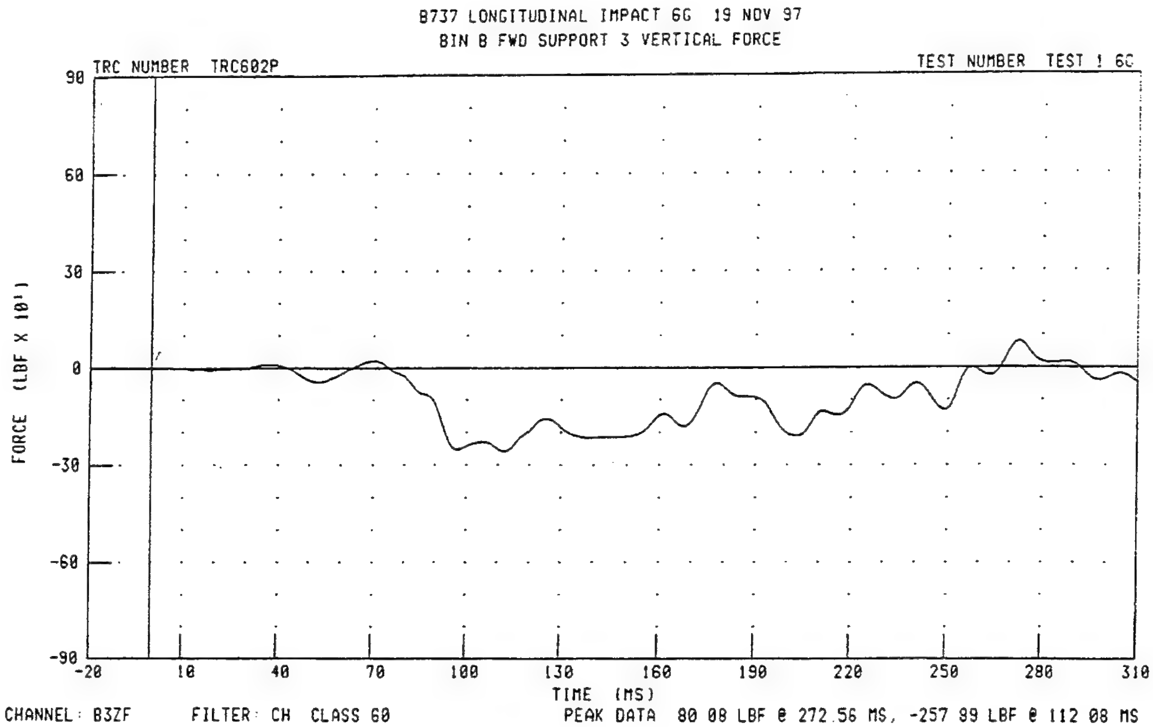

B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN 8 AFT LONGITUDINAL VELOCITY
TRC NUMBER TRC602V
TEST NUMBER TEST 1 6G
VELOCITY (FT/S)
TIME (MS)
CHANNEL: 8BAXV
FILTER: CH. CLASS 180
PEAK DATA: 0.00 FT/S @ -20.00 MS; -24.14 FT/S @ 215.12 MS

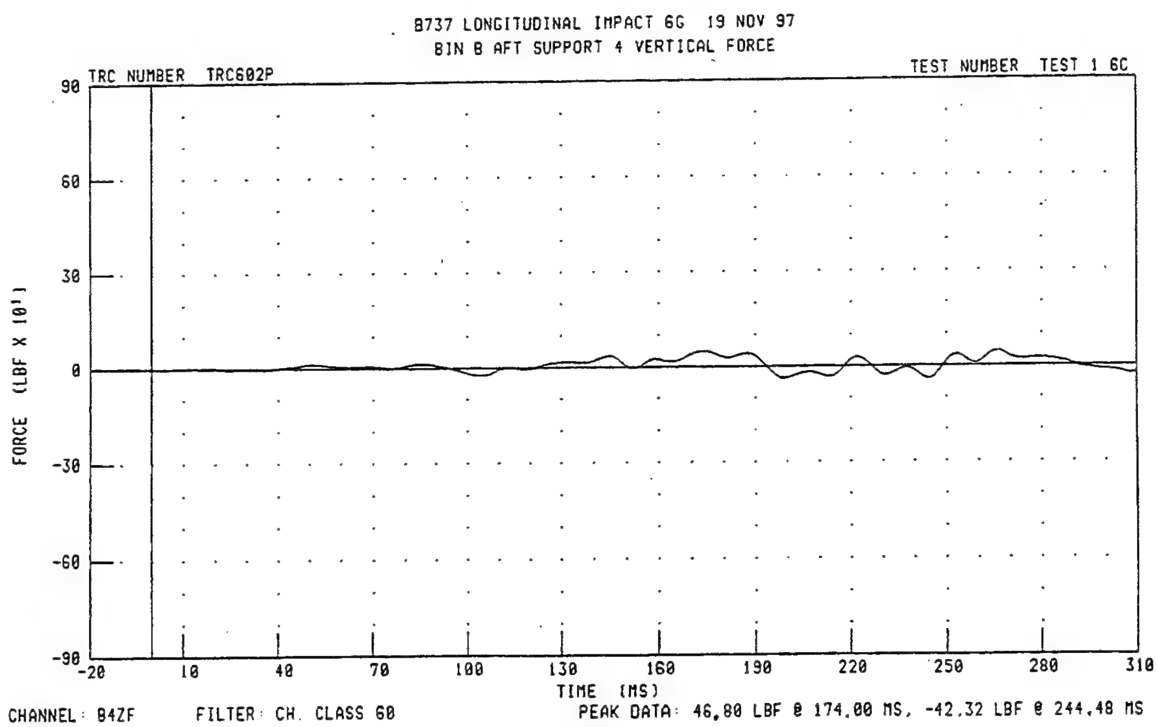


CHANNEL: B1ZF FILTER: CH. CLASS 60 PEAK DATA: 73 00 LBF @ 173 44 MS, -61 81 LBF @ 244 40 MS

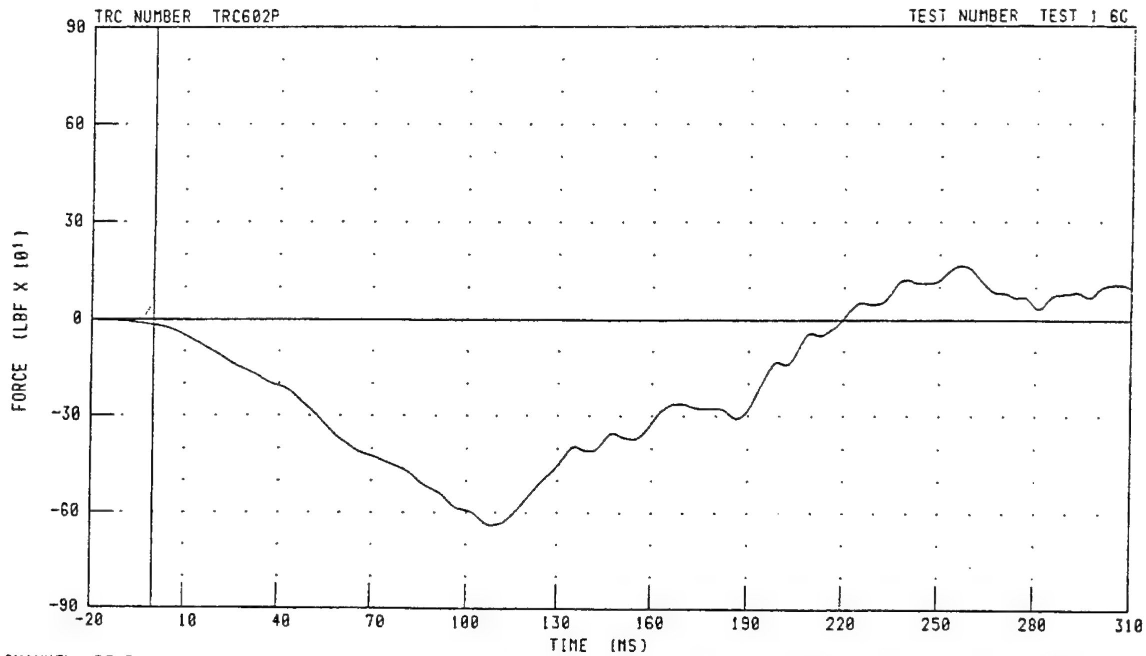


CHANNEL: B2ZF FILTER: CH. CLASS 60 PEAK DATA: 94.30 LBF @ 272.24 MS; -88.49 LBF @ 94.96 MS


B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN B FWD SUPPORT 3 VERTICAL FORCE
TRC NUMBER TRC602P
TEST NUMBER TEST 1 6G
FORCE (LBF X 10¹)
90
60
30
0
-30
-60
-90
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: B3ZF
FILTER: CH CLASS 60
PEAK DATA: 80.08 LBF @ 272.56 MS, -257.89 LBF @ 112.08 MS

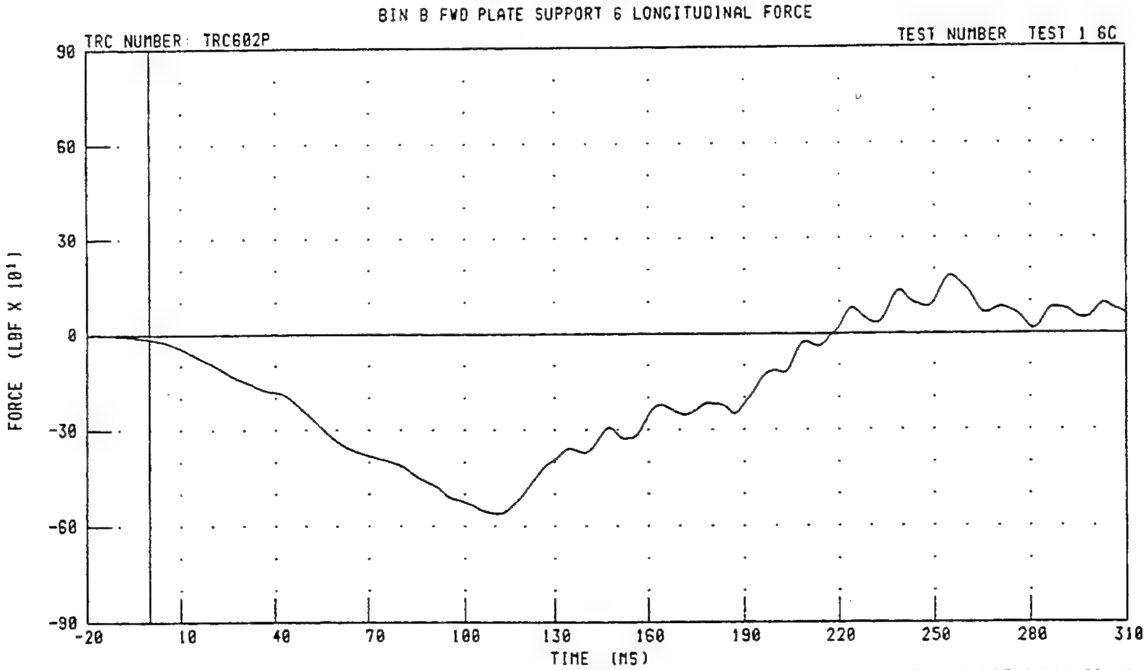

B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN B AFT SUPPORT 4 VERTICAL FORCE
TRC NUMBER TRC602P
TEST NUMBER TEST 1 6G
FORCE (LBF X 10¹)
90
60
30
0
-30
-60
-90
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: B4ZF
FILTER: CH. CLASS 60
PEAK DATA: 46.80 LBF @ 174.00 MS, -42.32 LBF @ 244.48 MS

B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN B AFT PLATE SUPPORT 5 LONGITUDINAL FORCE

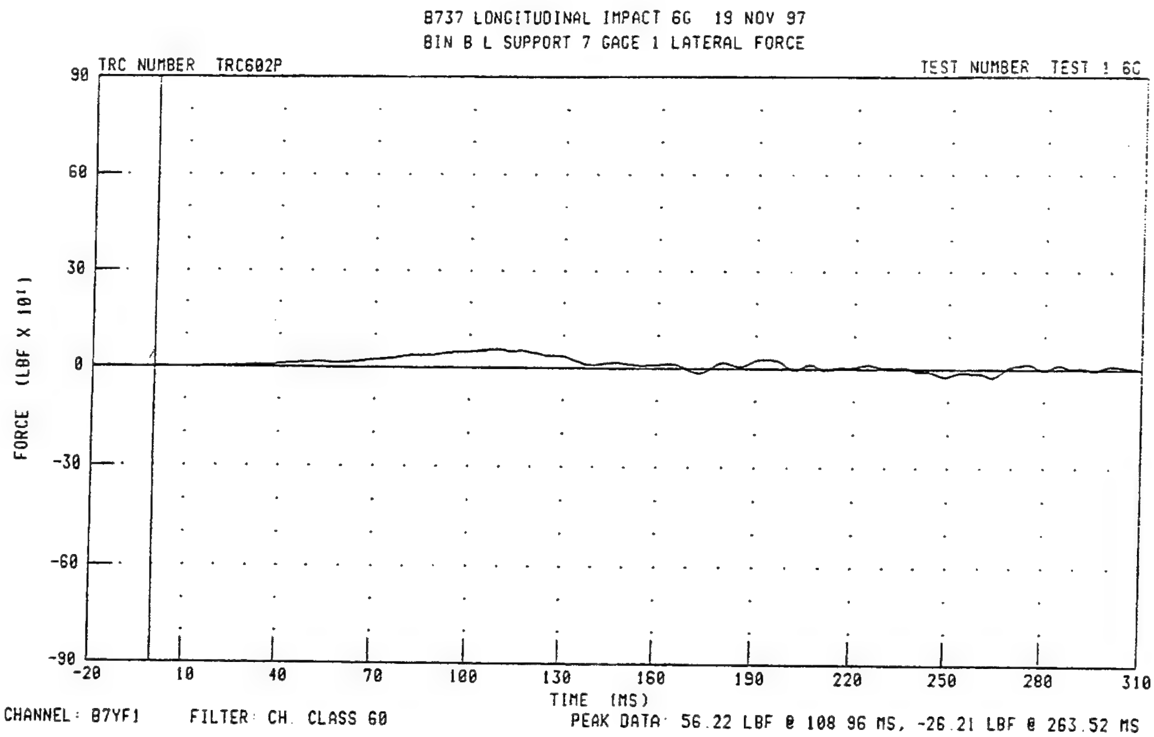


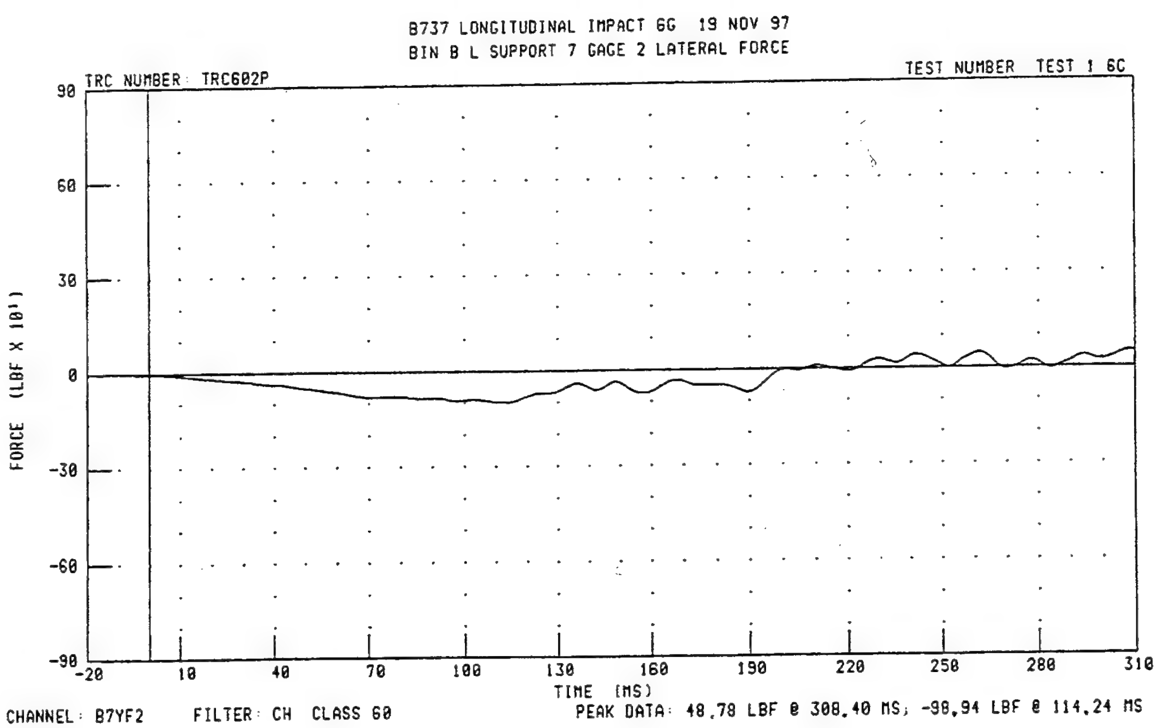
CHANNEL: B5XF FILTER: CH. CLASS 60 PEAK DATA: 166.59 LBF @ 256.64 MS, -638.03 LBF @ 108.56 MS

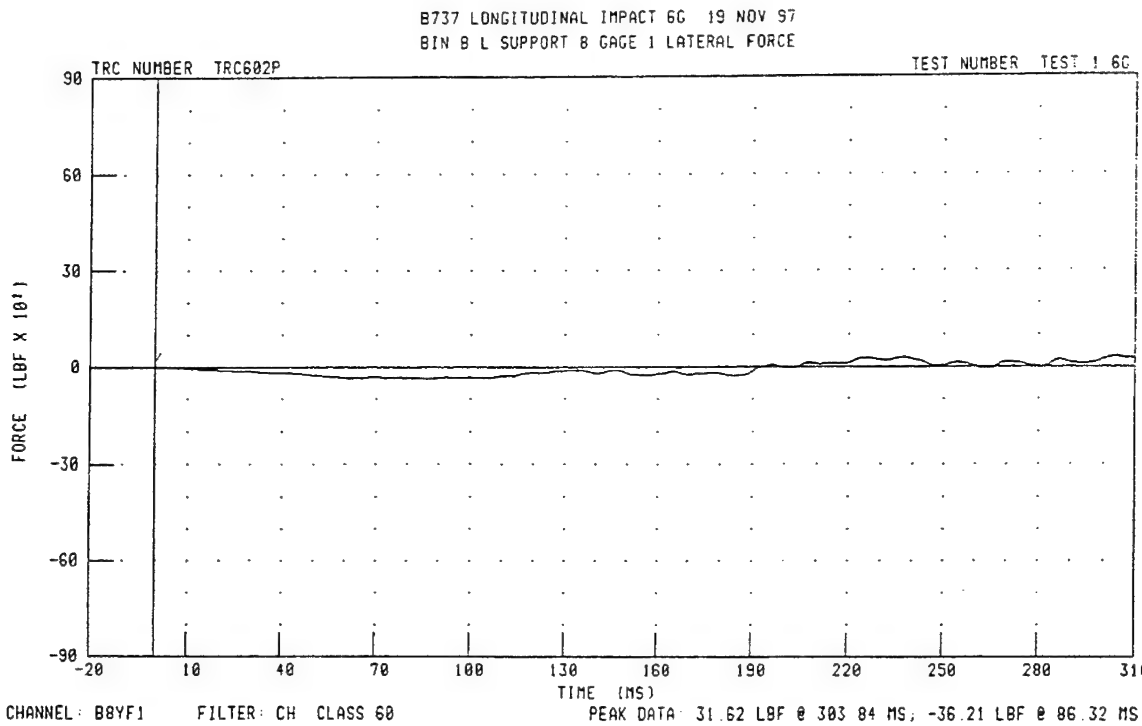
B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN B FWD PLATE SUPPORT 6 LONGITUDINAL FORCE

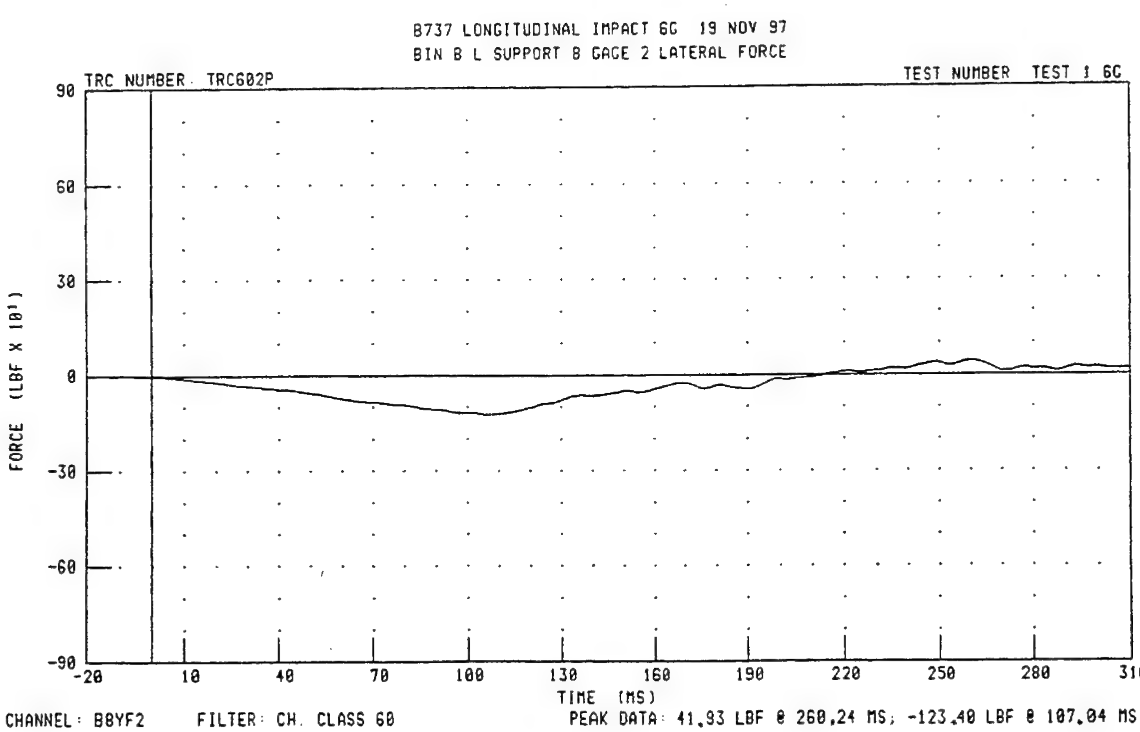


CHANNEL: B6XF FILTER: CH. CLASS 60 PEAK DATA: 179.97 LBF @ 255.28 MS; -561.29 LBF @ 111.20 MS

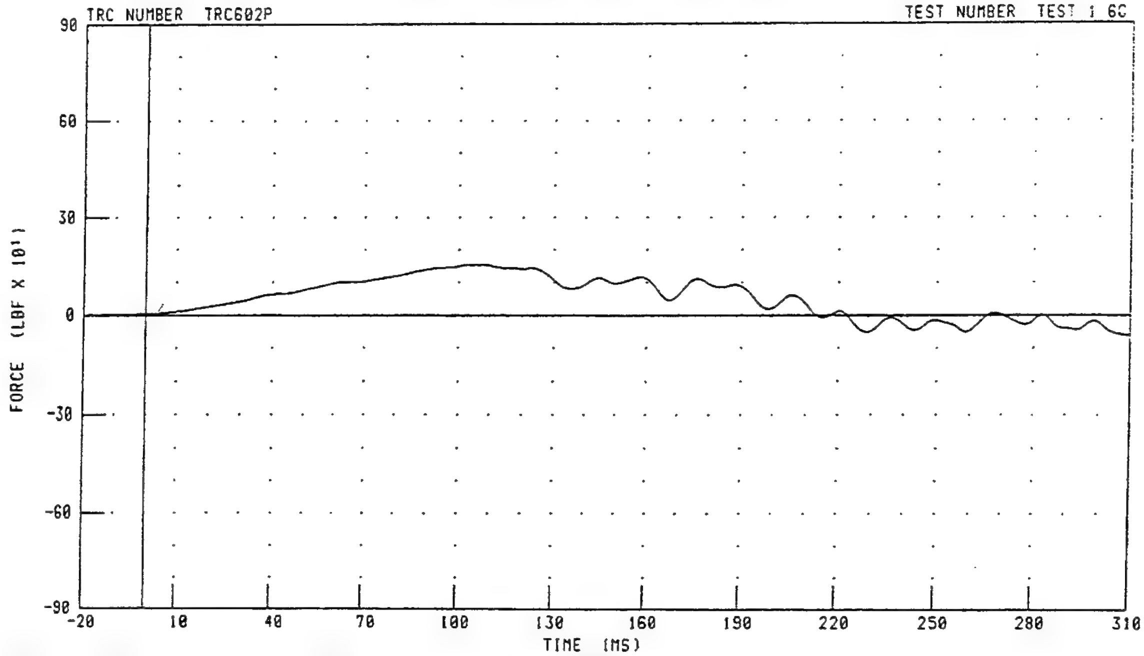

B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN B L SUPPORT 7 GAGE 1 LATERAL FORCE
TRC NUMBER TRC602P
TEST NUMBER TEST 1 6C
FORCE (LBF X 10')
TIME (MS)
CHANNEL: B7YF1
FILTER: CH. CLASS 60
PEAK DATA: 56.22 LBF @ 108.96 MS, -26.21 LBF @ 263.52 MS


B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN B L SUPPORT 7 GAGE 2 LATERAL FORCE
TRC NUMBER: TRC602P
TEST NUMBER TEST 1 6C
FORCE (LBF X 10')
TIME (MS)
CHANNEL: B7YF2
FILTER: CH CLASS 60
PEAK DATA: 48.78 LBF @ 308.40 MS; -98.94 LBF @ 114.24 MS


B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN B L SUPPORT 8 GAGE 1 LATERAL FORCE
TRC NUMBER TRC602P
TEST NUMBER TEST 1 6G
FORCE (LBF X 10')
TIME (MS)
CHANNEL: B8YF1
FILTER: CH CLASS 60
PEAK DATA: 31.62 LBF @ 303 84 MS; -36.21 LBF @ 86.32 MS

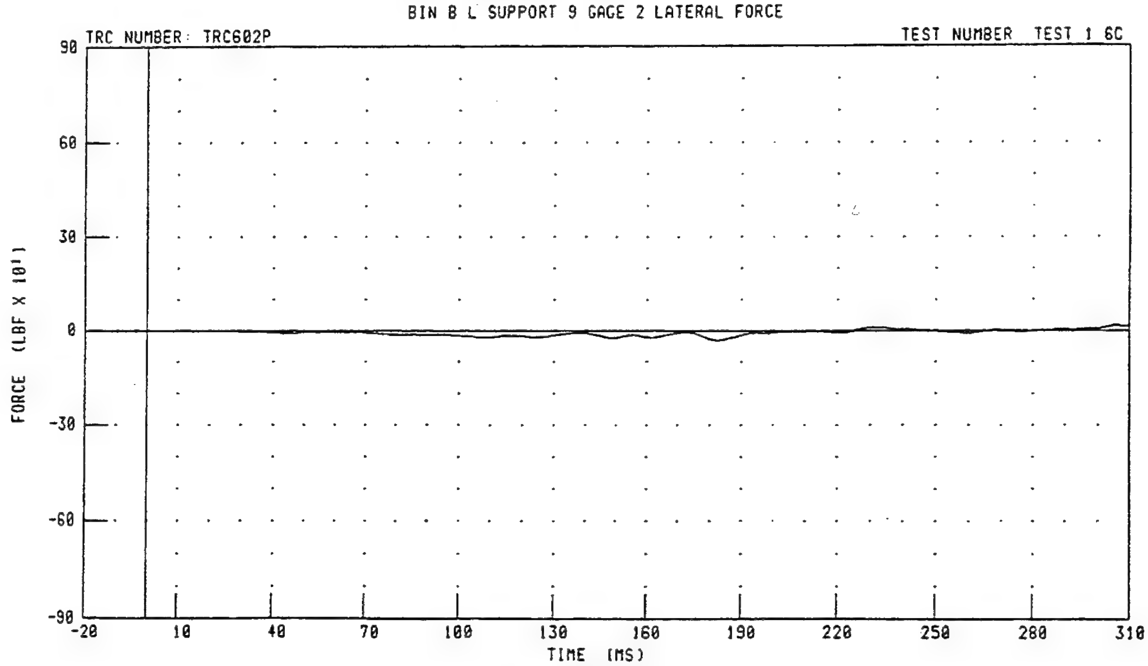

B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN B L SUPPORT 8 GAGE 2 LATERAL FORCE
TRC NUMBER TRC602P
TEST NUMBER TEST 1 6G
FORCE (LBF X 10')
TIME (MS)
CHANNEL: B8YF2
FILTER: CH. CLASS 60
PEAK DATA: 41.93 LBF @ 260.24 MS; -123.40 LBF @ 107.04 MS

B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN B L SUPPORT 9 GAGE 1 LATERAL FORCE

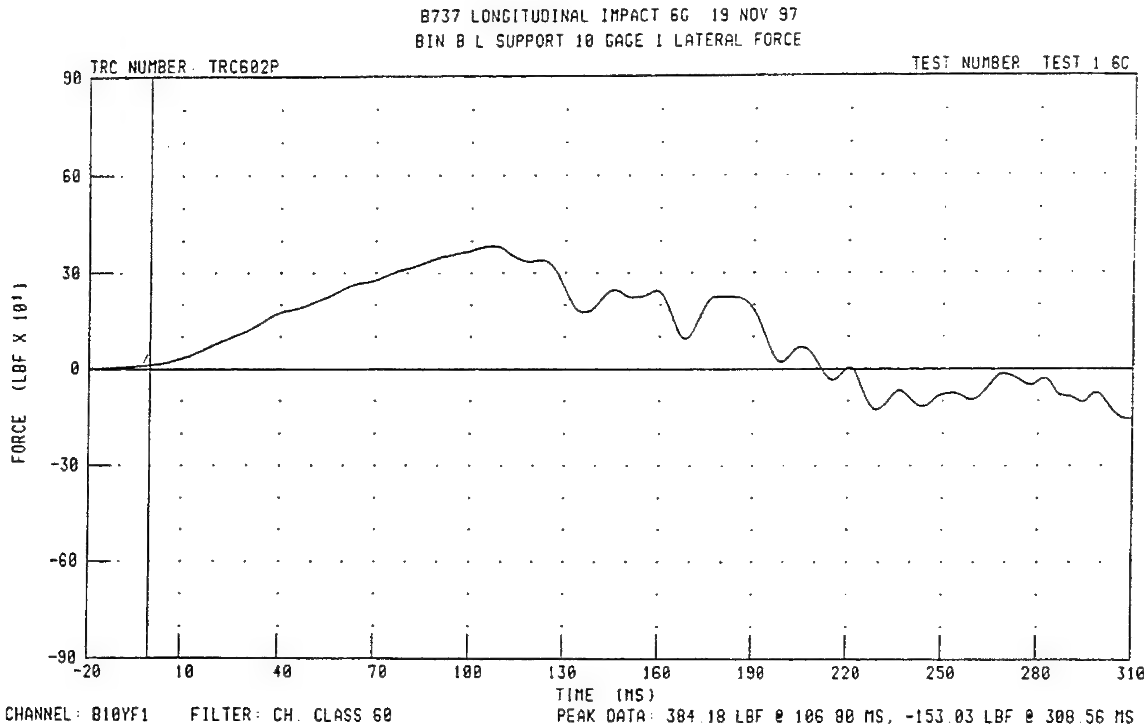


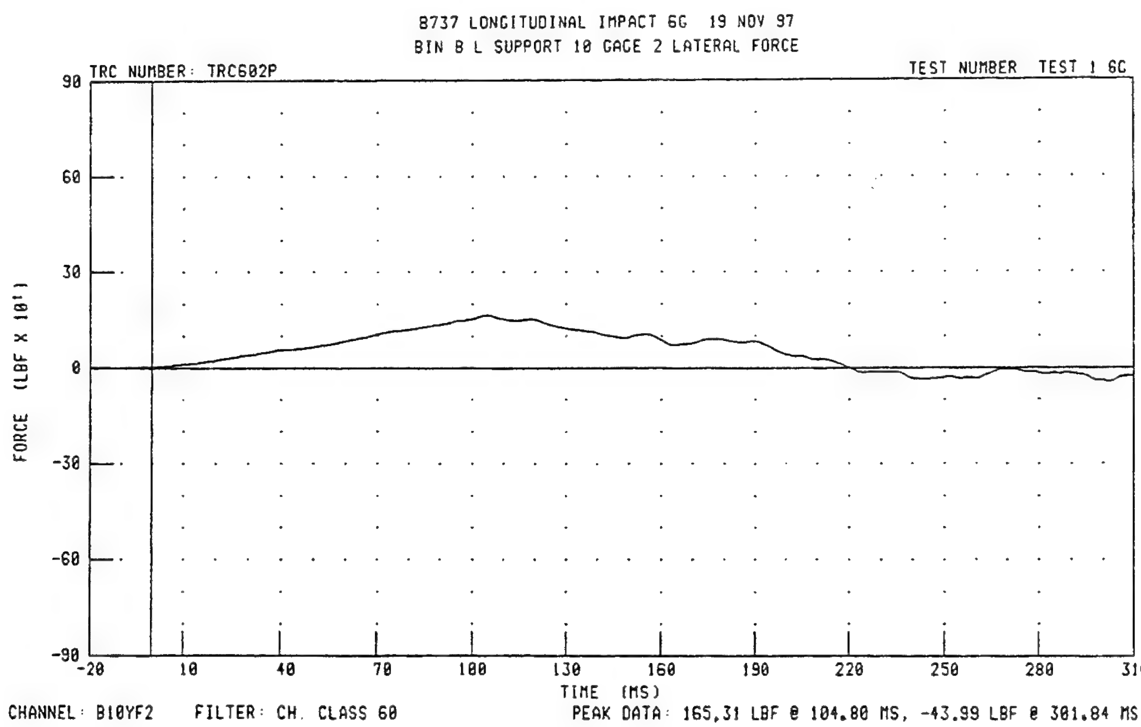
CHANNEL: B9YF1 FILTER: CH. CLASS 60 PEAK DATA 154 95 LBF @ 107 44 MS, -61 09 LBF @ 308 72 MS

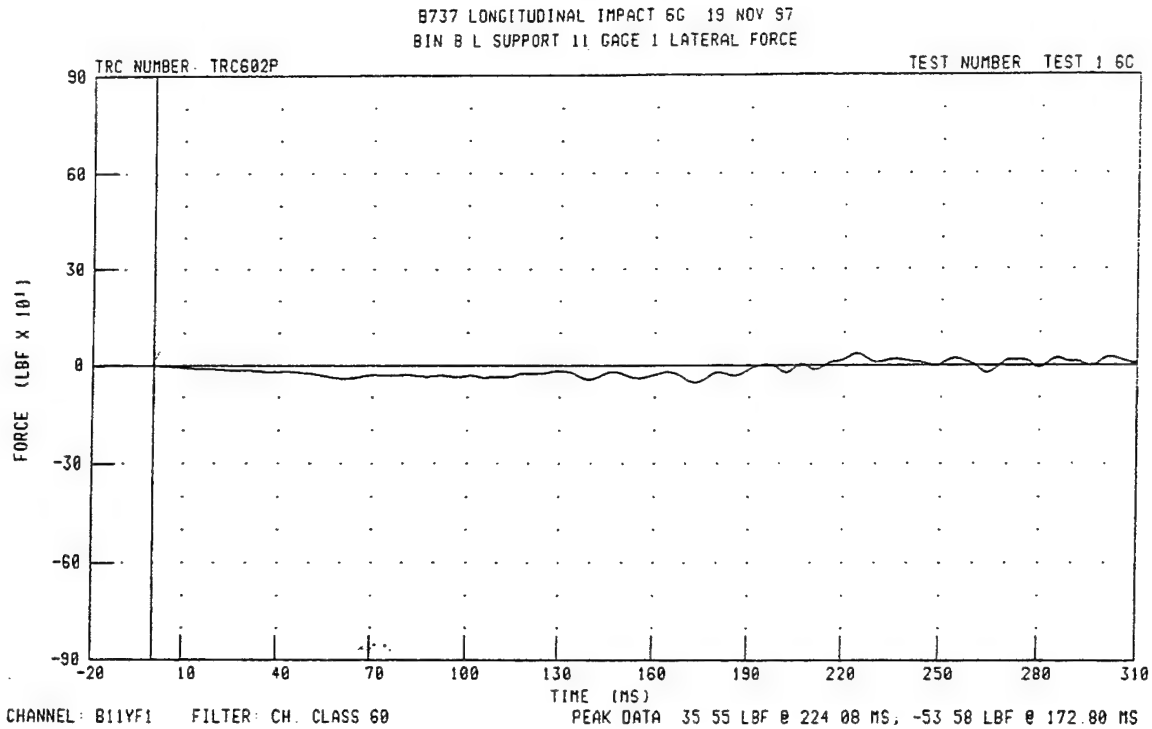
B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN B L SUPPORT 9 GAGE 2 LATERAL FORCE



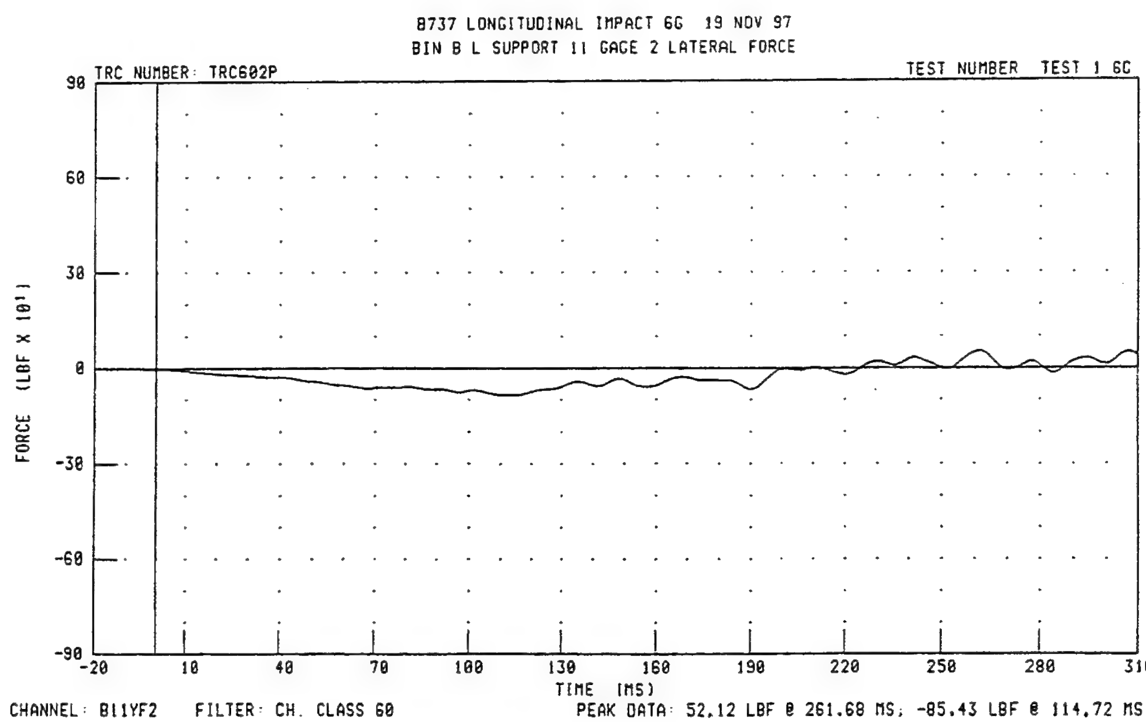
CHANNEL: B9YF2 FILTER: CH. CLASS 60 PEAK DATA: 16.33 LBF @ 305.68 MS; -30.75 LBF @ 182.56 MS


B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN B L SUPPORT 10 GAGE 1 LATERAL FORCE
TRC NUMBER: TRC602P
TEST NUMBER TEST 1 6G
FORCE (LBF X 10¹)
90
60
30
0
-30
-60
-90
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: B10YF1
FILTER: CH. CLASS 60
PEAK DATA: 384.18 LBF @ 106.80 MS, -153.03 LBF @ 308.56 MS

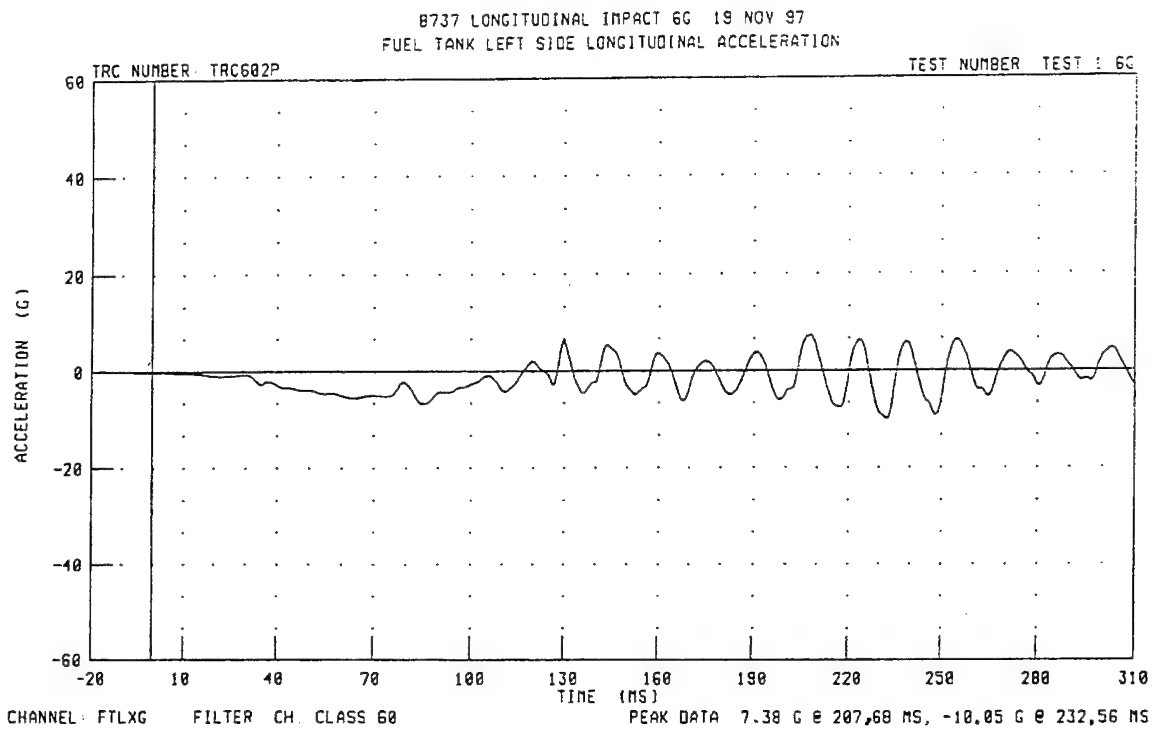

B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN B L SUPPORT 10 GAGE 2 LATERAL FORCE
TRC NUMBER: TRC602P
TEST NUMBER TEST 1 6G
FORCE (LBF X 10¹)
90
60
30
0
-30
-60
-90
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: B10YF2
FILTER: CH. CLASS 60
PEAK DATA: 165.31 LBF @ 104.80 MS, -43.99 LBF @ 301.84 MS

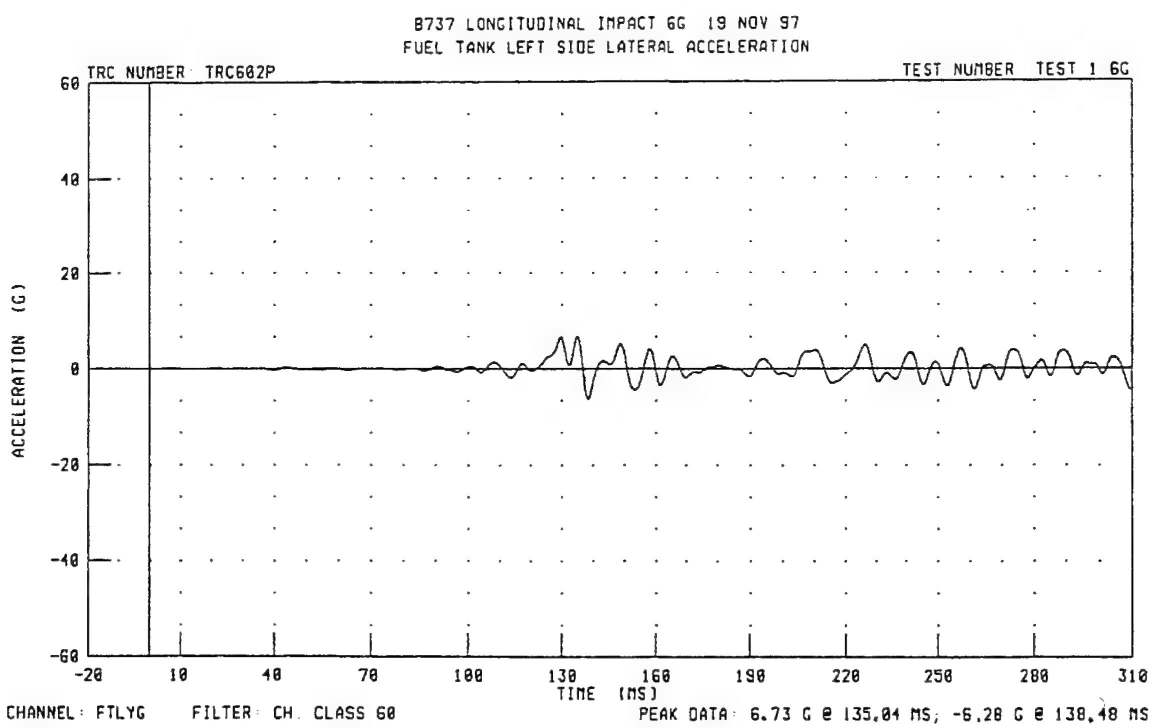


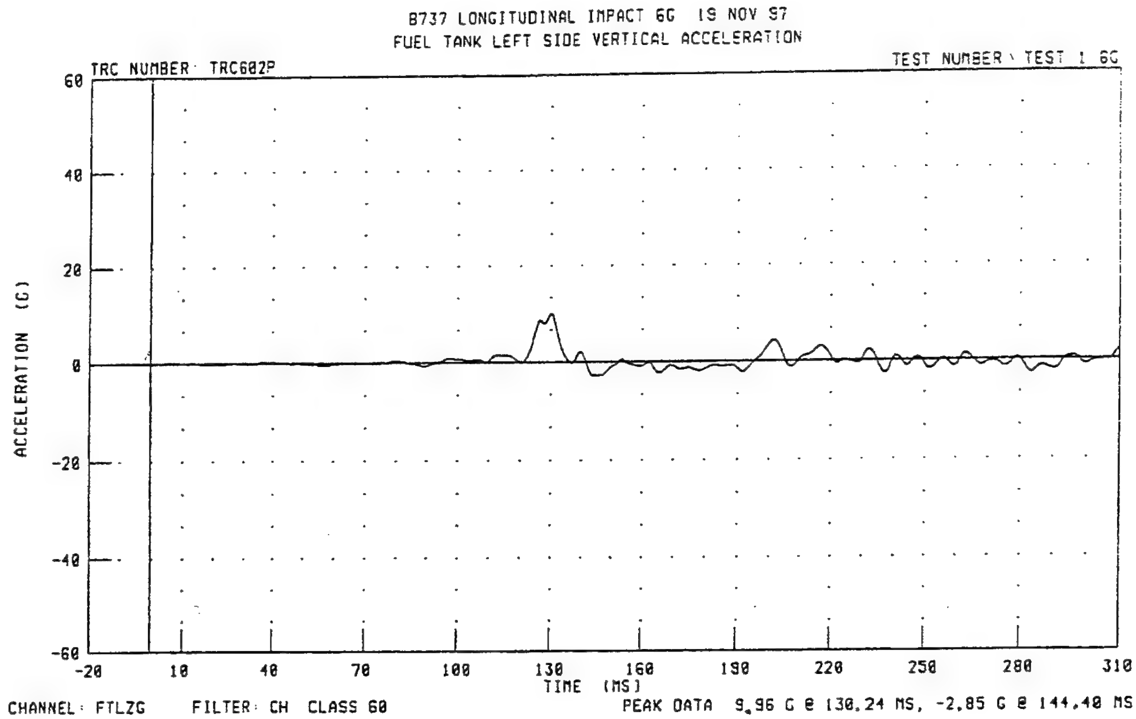
B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN B L SUPPORT 11 GAGE 1 LATERAL FORCE
TRC NUMBER: TRC602P
TEST NUMBER TEST 1 6G
FORCE (LBF X 10¹)
90
60
30
0
-30
-60
-90
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: B11YF1 FILTER: CH. CLASS 60
PEAK DATA 35 55 LBF @ 224 08 MS; -53 58 LBF @ 172.80 MS



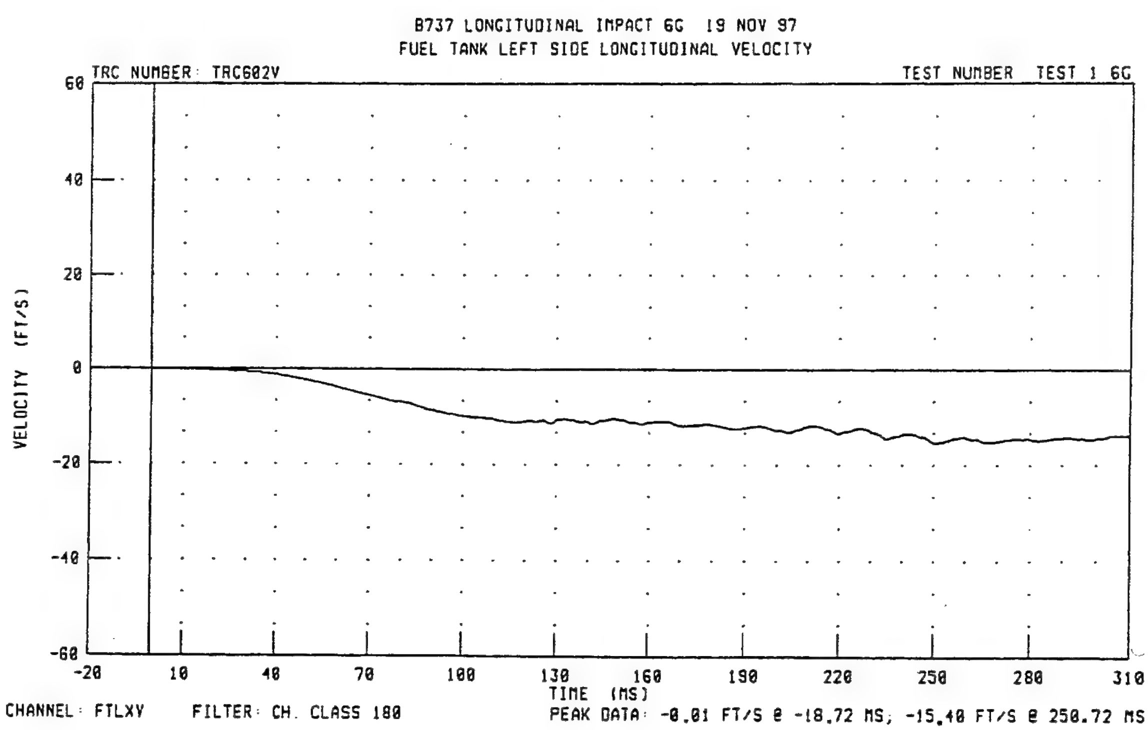
B737 LONGITUDINAL IMPACT 6G 19 NOV 97
BIN B L SUPPORT 11 GAGE 2 LATERAL FORCE
TRC NUMBER: TRC602P
TEST NUMBER TEST 1 6G
FORCE (LBF X 10¹)
90
60
30
0
-30
-60
-90
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: B11YF2 FILTER: CH. CLASS 60
PEAK DATA: 52.12 LBF @ 261.68 MS; -85.43 LBF @ 114.72 MS


B737 LONGITUDINAL IMPACT 6G 19 NOV 97
FUEL TANK LEFT SIDE LONGITUDINAL ACCELERATION
TRC NUMBER TRC602P
TEST NUMBER TEST 1 6G
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: FTLXG
FILTER CH. CLASS 60
PEAK DATA 7.38 G @ 207.68 MS, -10.05 G @ 232.56 MS


B737 LONGITUDINAL IMPACT 6G 19 NOV 97
FUEL TANK LEFT SIDE LATERAL ACCELERATION
TRC NUMBER TRC602P
TEST NUMBER TEST 1 6G
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: FTLYG
FILTER: CH. CLASS 60
PEAK DATA: 6.73 G @ 135.04 MS, -6.28 G @ 138.48 MS

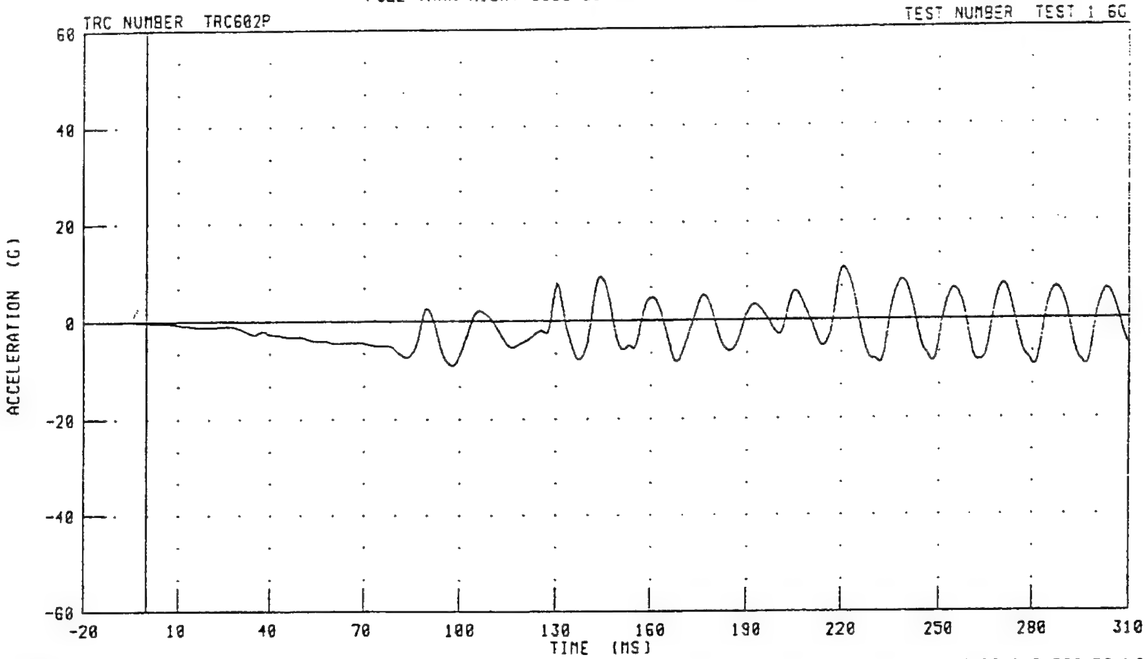


B737 LONGITUDINAL IMPACT 6G 19 NOV 97
FUEL TANK LEFT SIDE VERTICAL ACCELERATION
TRC NUMBER: TRC602P
TEST NUMBER: TEST 1 6G
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: FTLZG
FILTER: CH CLASS 60
PEAK DATA 9.96 G @ 130.24 MS, -2.85 G @ 144.40 MS



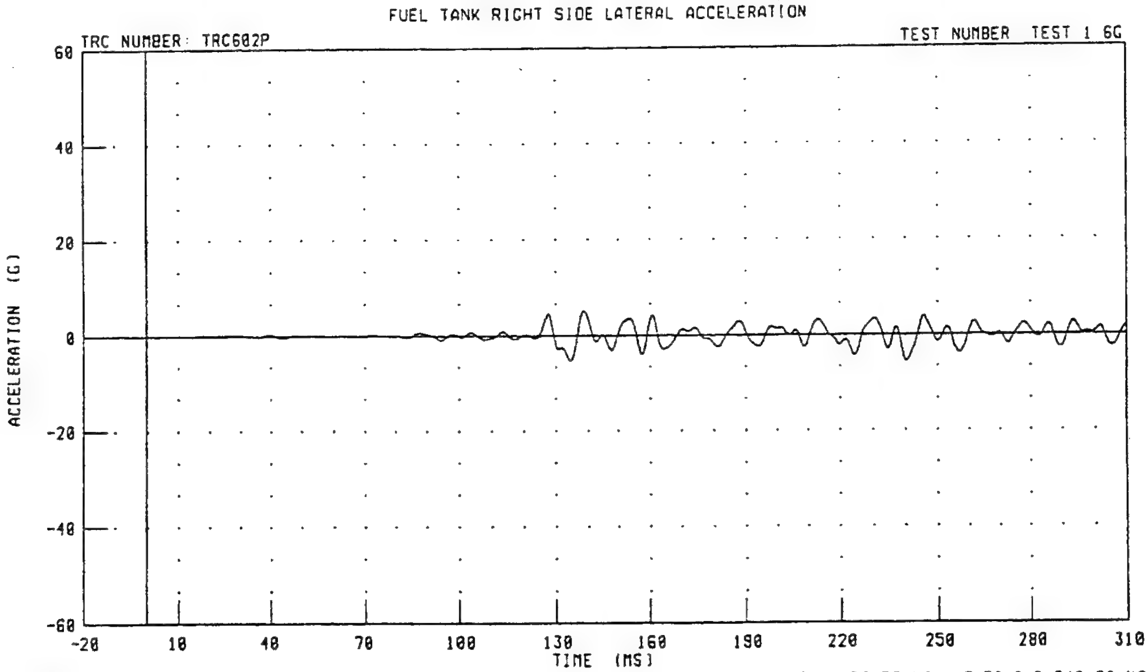
B737 LONGITUDINAL IMPACT 6G 19 NOV 97
FUEL TANK LEFT SIDE LONGITUDINAL VELOCITY
TRC NUMBER: TRC602V
TEST NUMBER TEST 1 6G
VELOCITY (FT/S)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: FTLXV
FILTER: CH. CLASS 180
PEAK DATA: -0.01 FT/S @ -18.72 MS; -15.40 FT/S @ 250.72 MS

B737 LONGITUDINAL IMPACT 6G 19 NOV 97
FUEL TANK RIGHT SIDE LONGITUDINAL ACCELERATION



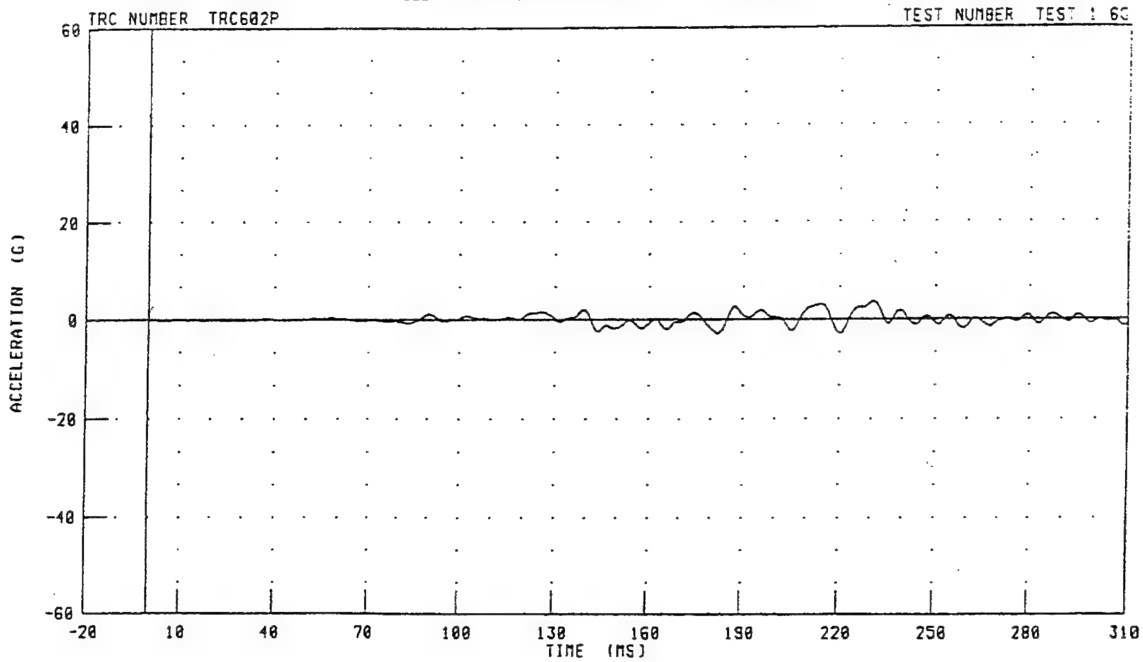
CHANNEL: FTRXG FILTER: CH CLASS 60 PEAK DATA: 10.65 G @ 220.72 MS, -9.38 G @ 280.56 MS

B737 LONGITUDINAL IMPACT 6G 19 NOV 97
FUEL TANK RIGHT SIDE LATERAL ACCELERATION



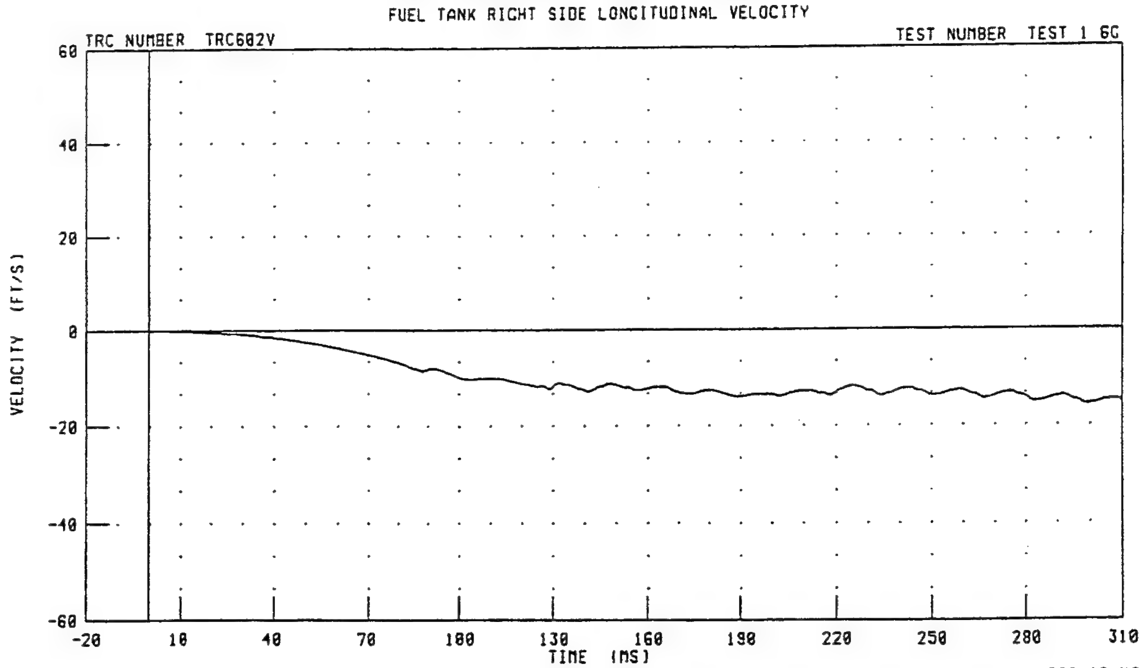
CHANNEL: FTRYG FILTER: CH CLASS 60 PEAK DATA: 5.18 G @ 138.72 MS; -5.59 G @ 240.32 MS

B737 LONGITUDINAL IMPACT 6G 19 NOV 97
FUEL TANK RIGHT SIDE VERTICAL ACCELERATION

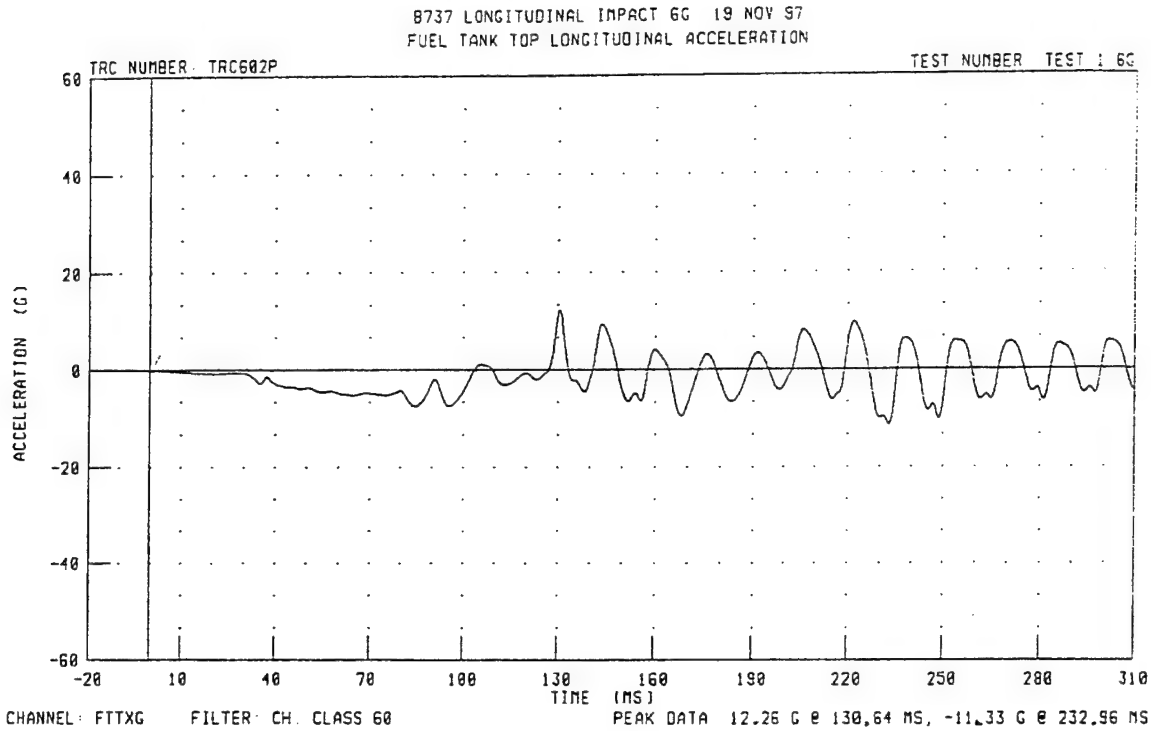


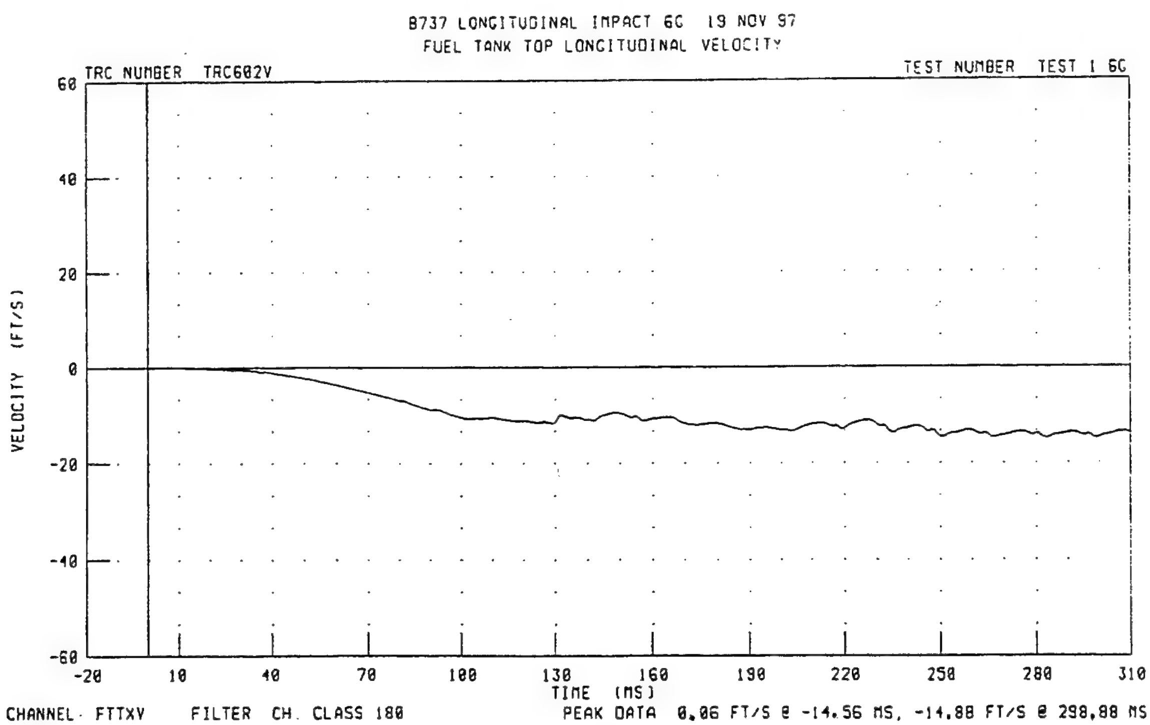
CHANNEL: FTRZG FILTER: CH. CLASS 60 PEAK DATA 3.61 G @ 230.64 MS; -2.90 G @ 220.24 MS

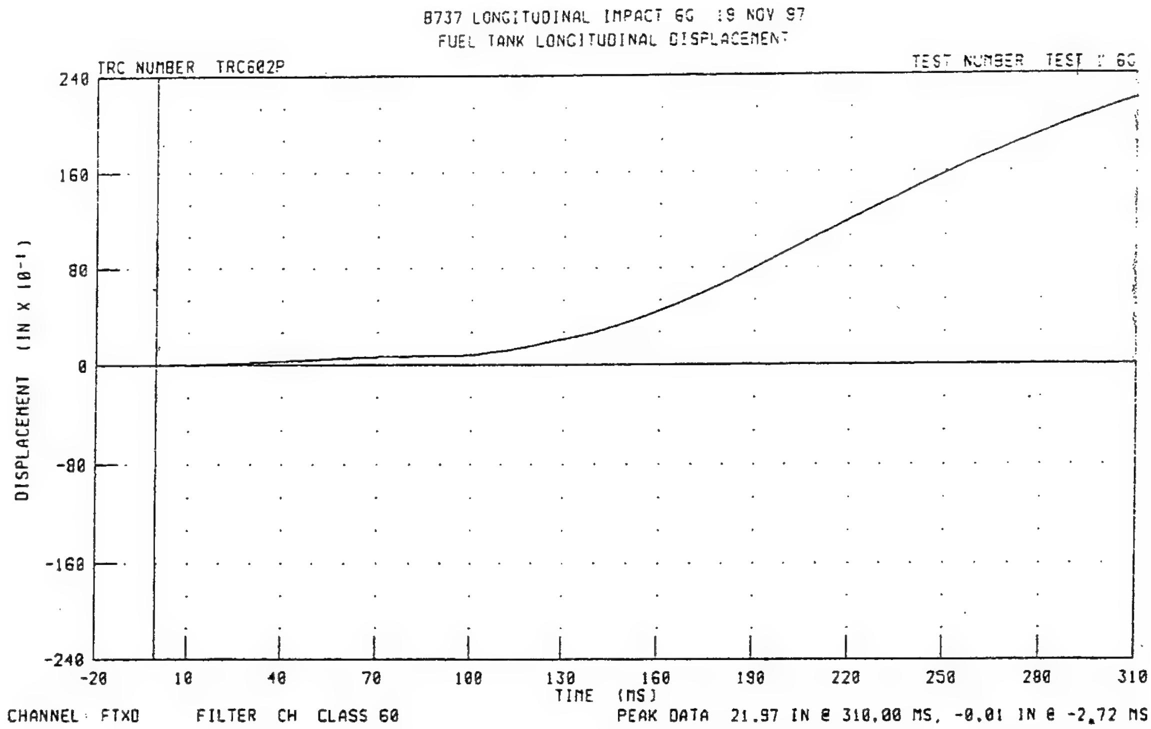
B737 LONGITUDINAL IMPACT 6G 19 NOV 97
FUEL TANK RIGHT SIDE LONGITUDINAL VELOCITY



CHANNEL: FTRXV FILTER: CH. CLASS 180 PEAK DATA: 0.03 FT/S @ -18.08 MS; -15.78 FT/S @ 299.12 MS

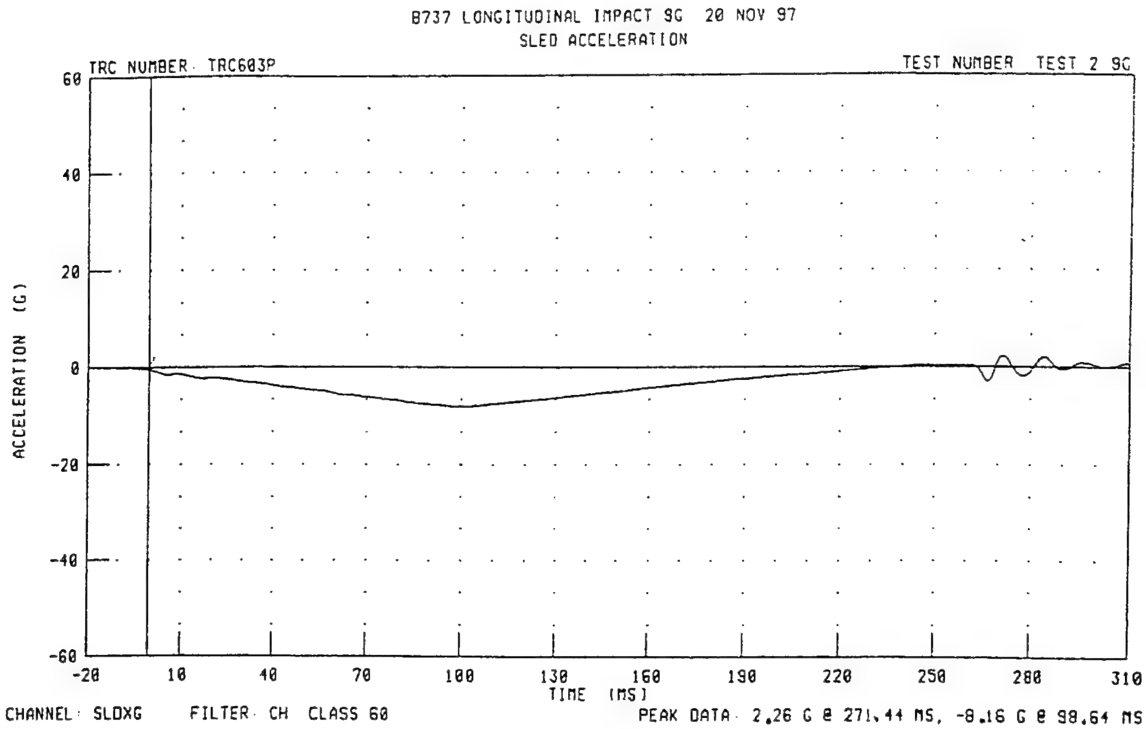

B737 LONGITUDINAL IMPACT 6G 19 NOV 97
FUEL TANK TOP LONGITUDINAL ACCELERATION
TRC NUMBER TRC602P
TEST NUMBER TEST 1 6G
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: FTTXG
FILTER CH. CLASS 60
PEAK DATA 12.26 G @ 130.64 MS, -11.33 G @ 232.96 MS


B737 LONGITUDINAL IMPACT 6G 19 NOV 97
FUEL TANK TOP LONGITUDINAL VELOCITY
TRC NUMBER TRC602V
TEST NUMBER TEST 1 6G
VELOCITY (FT/S)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL FTTXV
FILTER CH. CLASS 180
PEAK DATA 0.06 FT/S @ -14.56 MS, -14.88 FT/S @ 298.88 MS

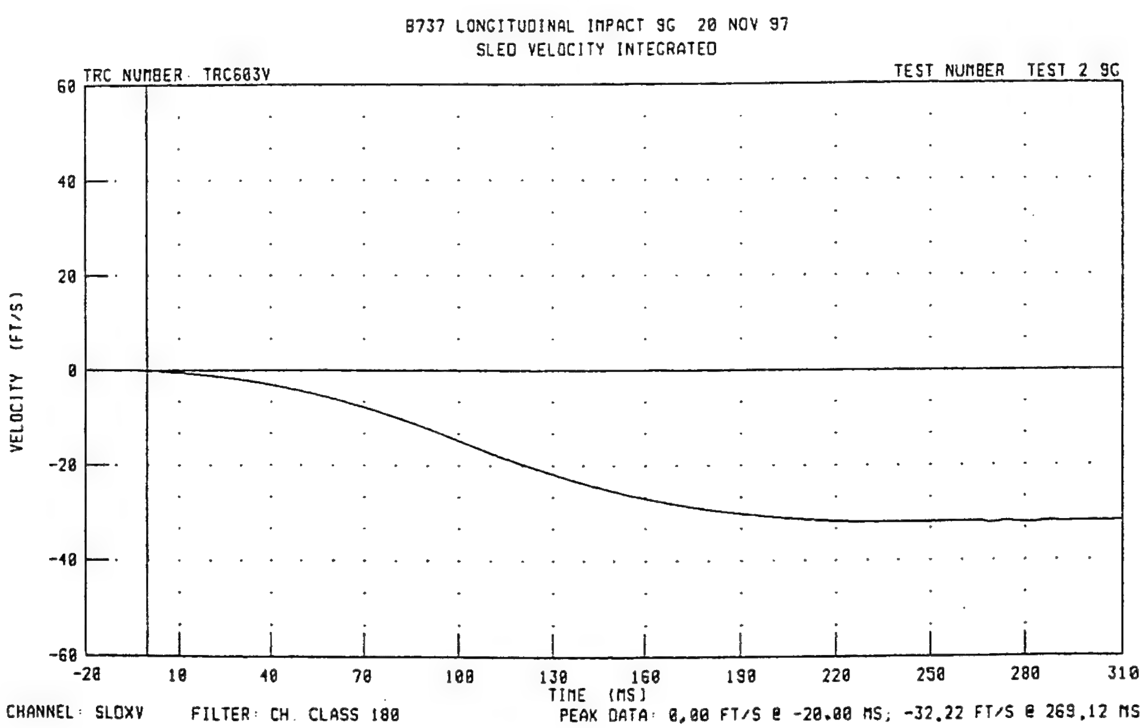


B737 LONGITUDINAL IMPACT 6G 19 NOV 97
FUEL TANK LONGITUDINAL DISPLACEMENT
TRC NUMBER TRC602P
TEST NUMBER TEST # 6G
DISPLACEMENT (IN X 10⁻¹)
240
160
80
0
-80
-160
-240
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL : FTXD
FILTER CH CLASS 60
PEAK DATA 21.97 IN @ 310.00 MS, -0.01 IN @ -2.72 MS

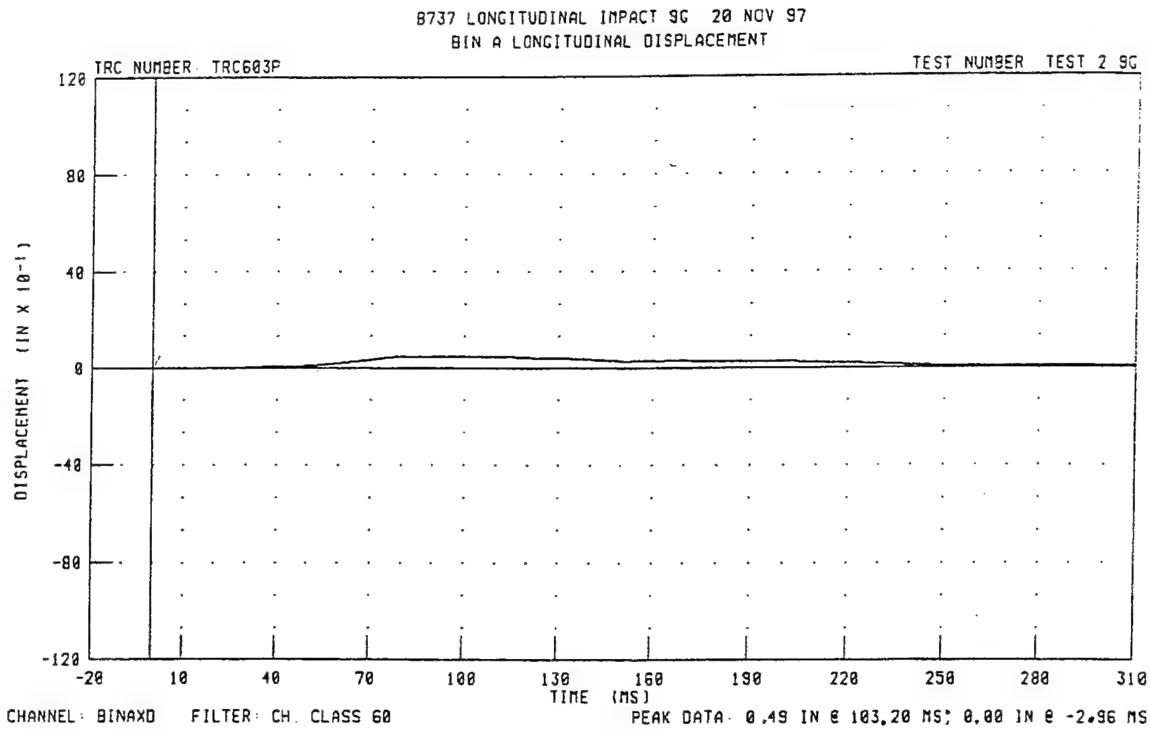
TEST 2

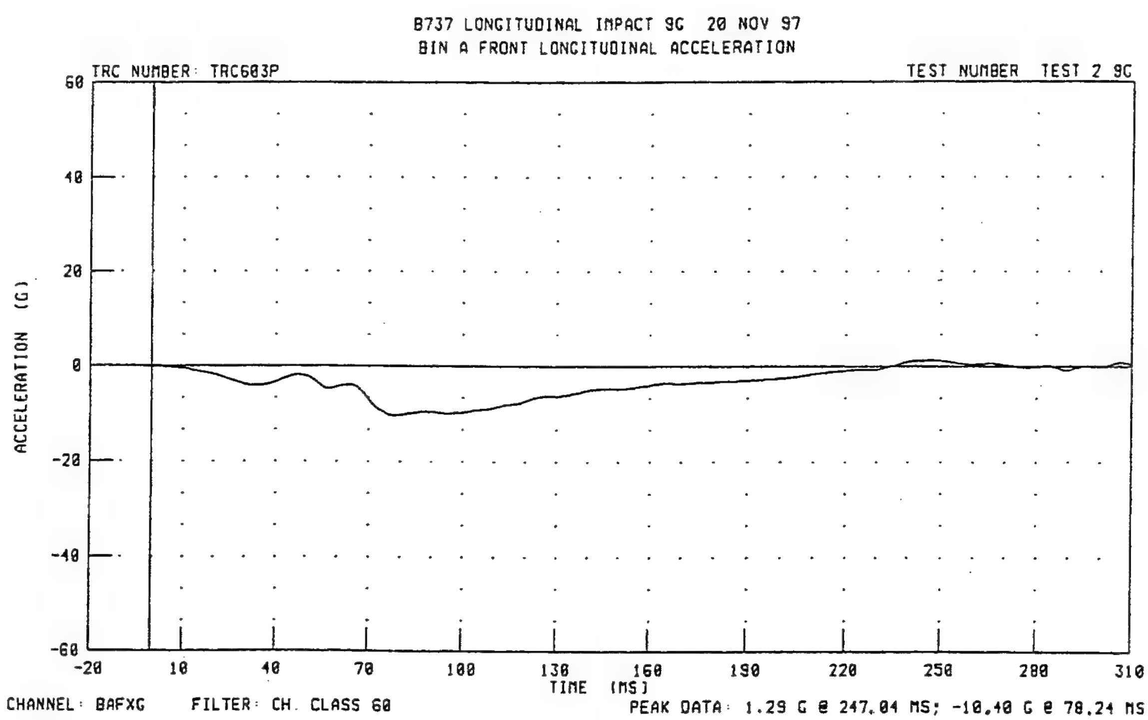


B737 LONGITUDINAL IMPACT 9G 20 NOV 97
SLED ACCELERATION
TRC NUMBER TRC603P
TEST NUMBER TEST 2 9G
ACCELERATION (G)
TIME (MS)
CHANNEL: SLDXG
FILTER: CH CLASS 60
PEAK DATA: 2.26 G @ 271.44 MS, -8.16 G @ 98.64 MS

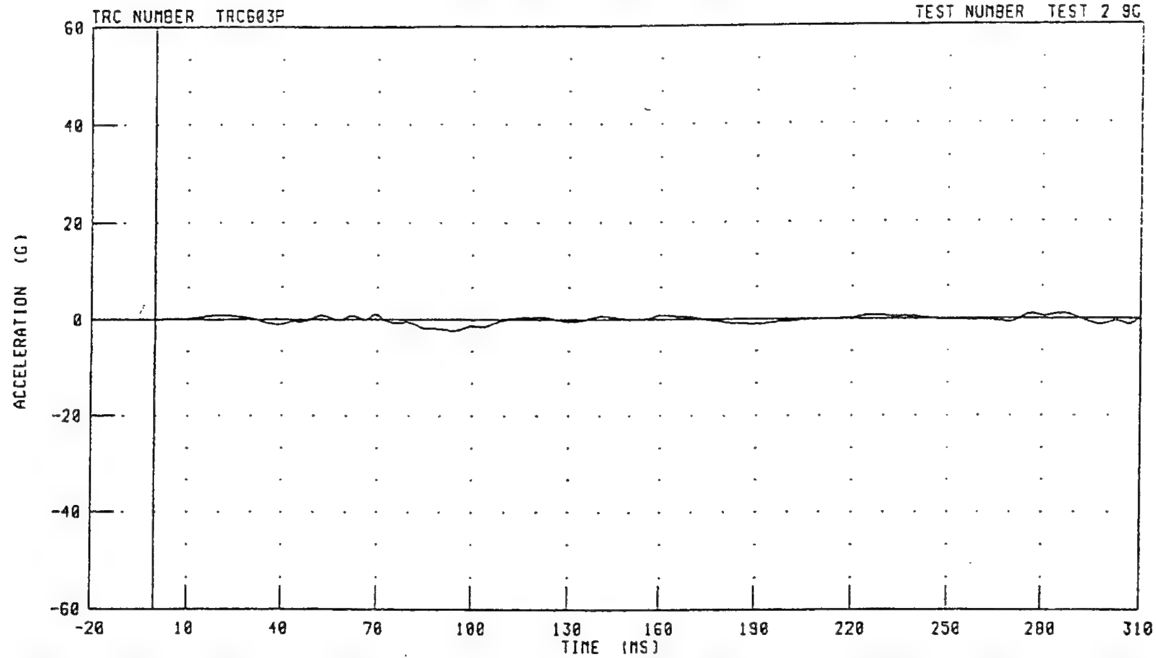


B737 LONGITUDINAL IMPACT 9G 20 NOV 97
SLED VELOCITY INTEGRATED
TRC NUMBER TRC603V
TEST NUMBER TEST 2 9G
VELOCITY (FT/S)
TIME (MS)
CHANNEL: SLDXV
FILTER: CH. CLASS 180
PEAK DATA: 0.00 FT/S @ -20.00 MS; -32.22 FT/S @ 269.12 MS


B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN A LONGITUDINAL DISPLACEMENT
TRC NUMBER: TRC603P
TEST NUMBER TEST 2 9G
DISPLACEMENT (IN X 10⁻¹)
120
80
40
0
-40
-80
-120
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BINAXD FILTER: CH. CLASS 60
PEAK DATA: 0.49 IN @ 103.20 MS; 0.00 IN @ -2.96 MS

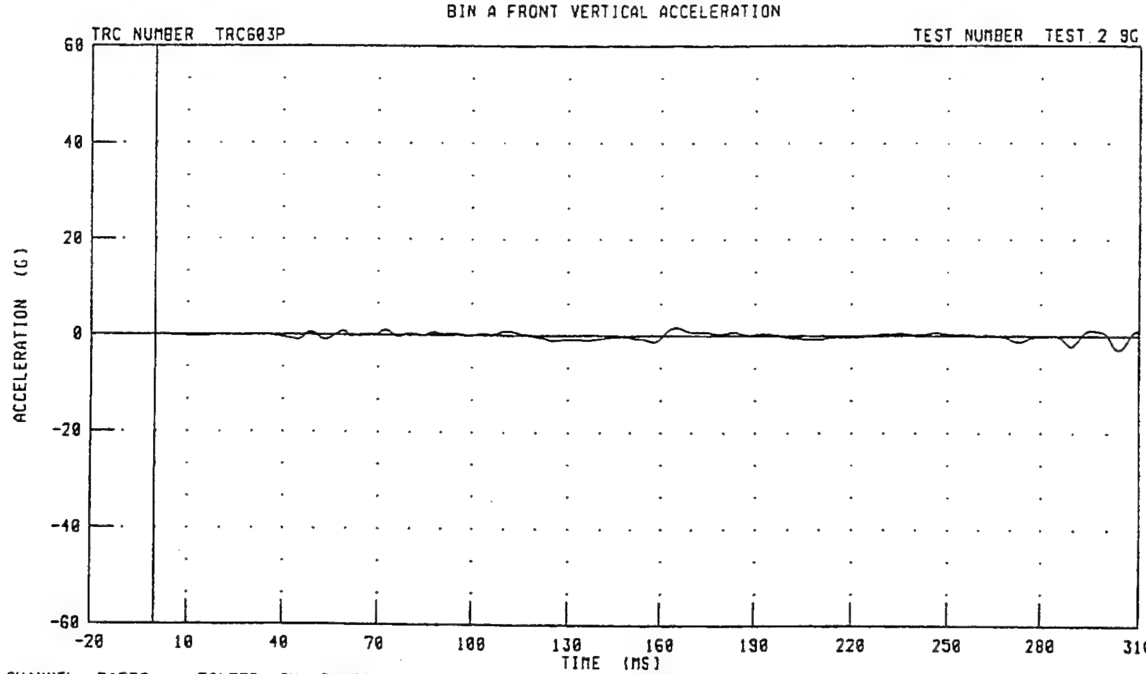

B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN A FRONT LONGITUDINAL ACCELERATION
TRC NUMBER: TRC603P
TEST NUMBER TEST 2 9G
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BAFXG FILTER: CH. CLASS 60
PEAK DATA: 1.29 G @ 247.04 MS; -10.40 G @ 78.24 MS

B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN A FRONT LATERAL ACCELERATION

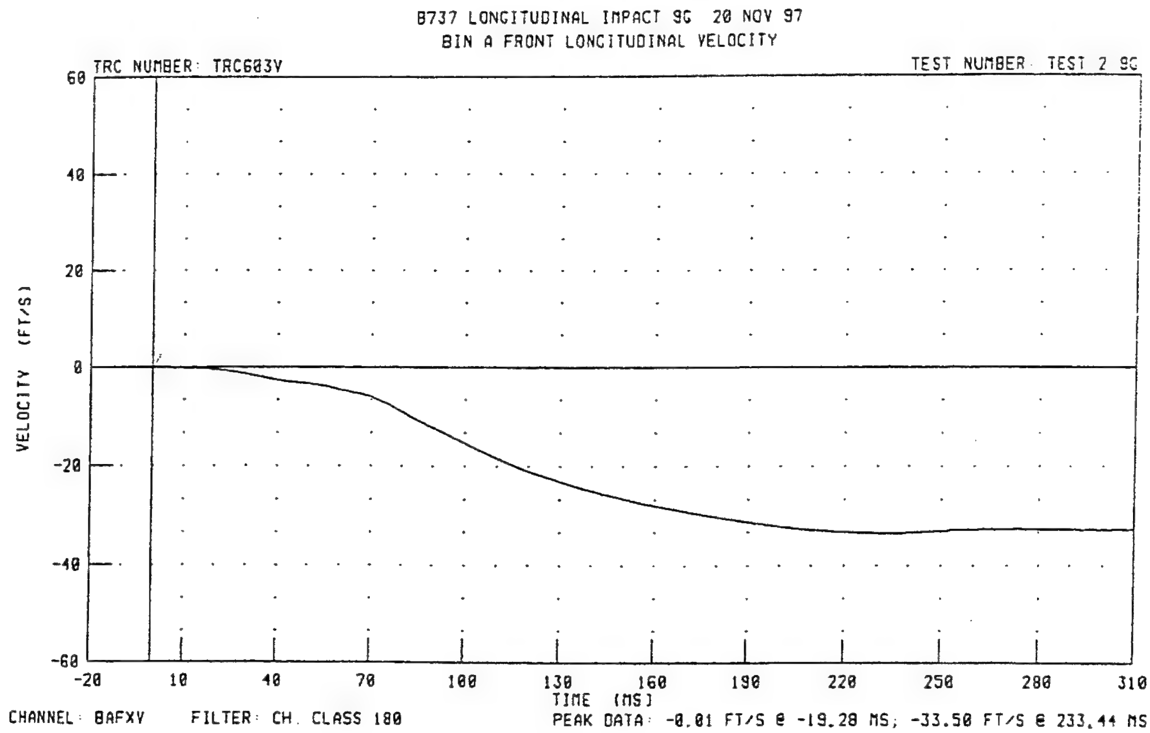


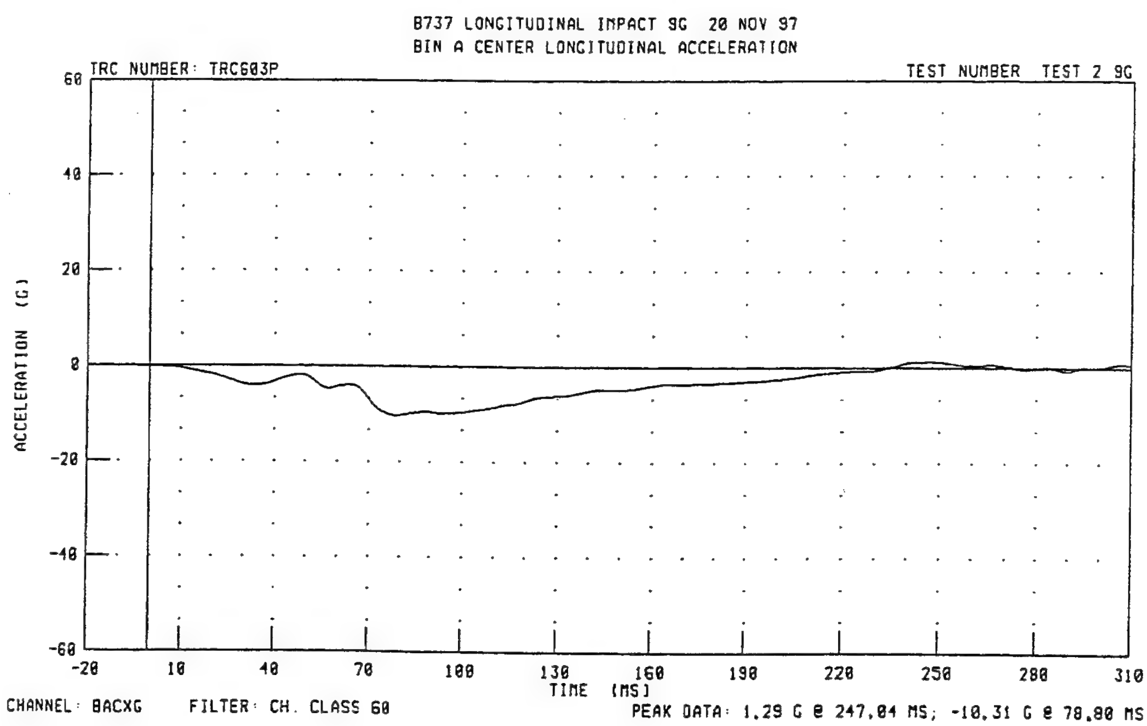
CHANNEL: BAFYG FILTER: CH. CLASS 60 PEAK DATA 1.09 G @ 285.84 MS, -2.36 G @ 94.08 MS

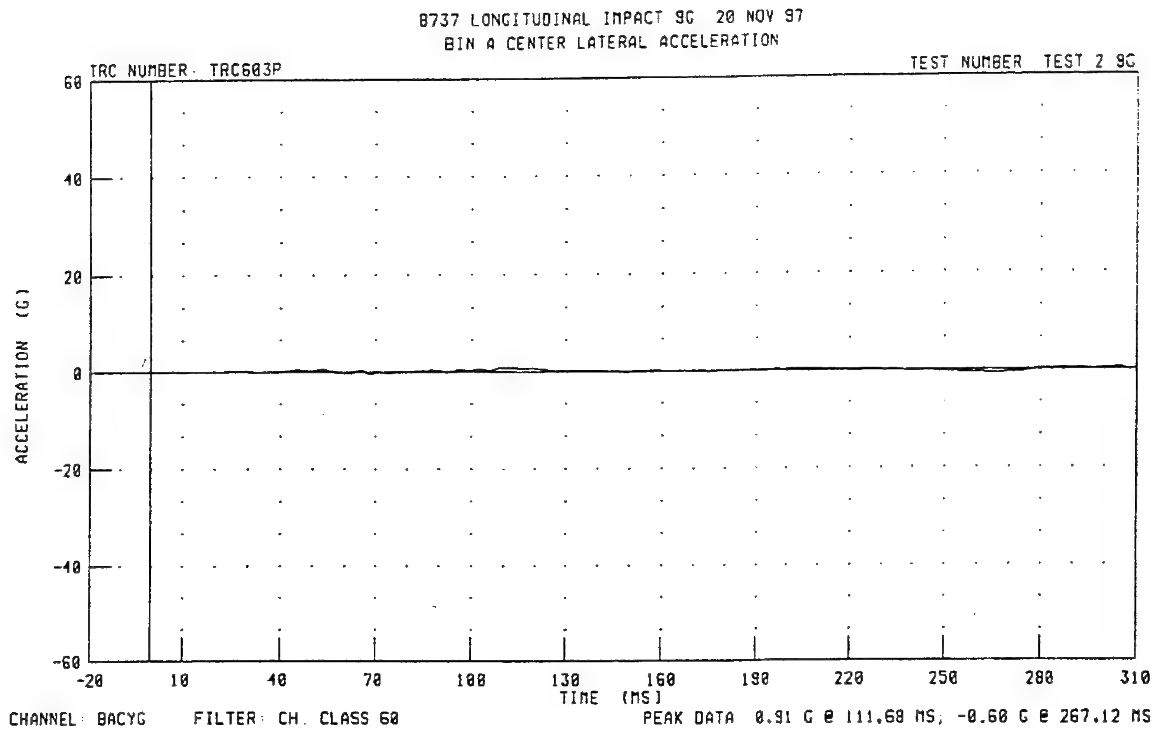
B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN A FRONT VERTICAL ACCELERATION

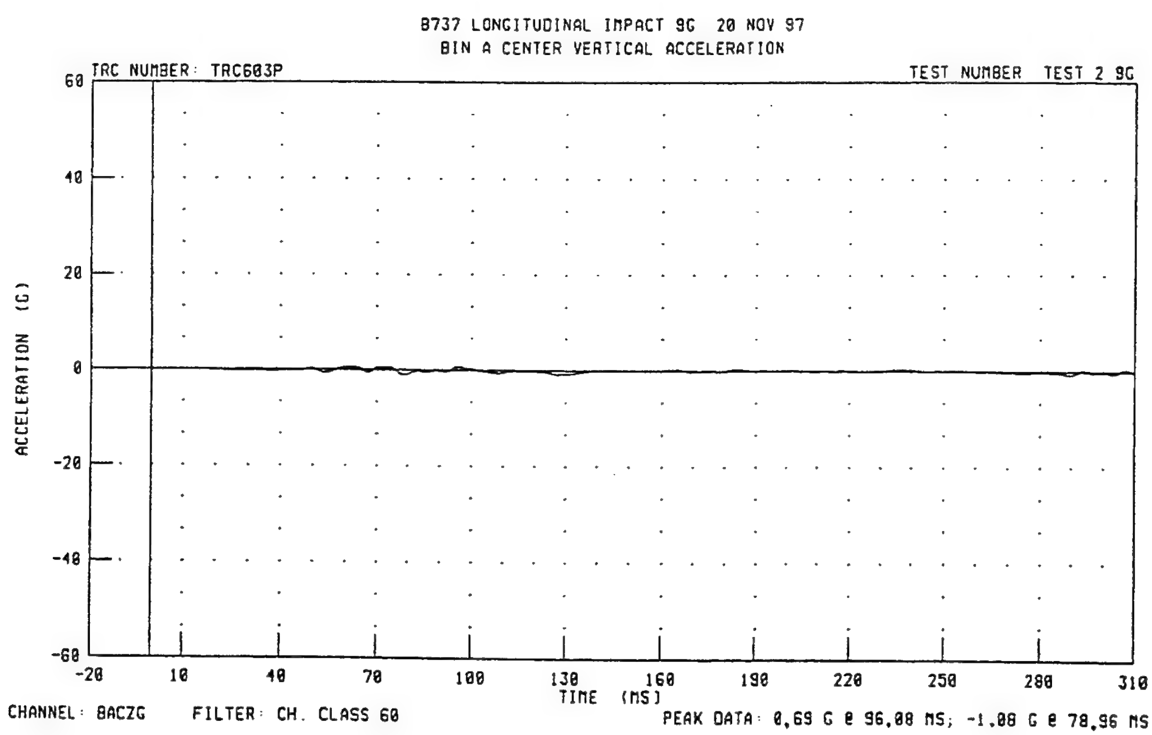


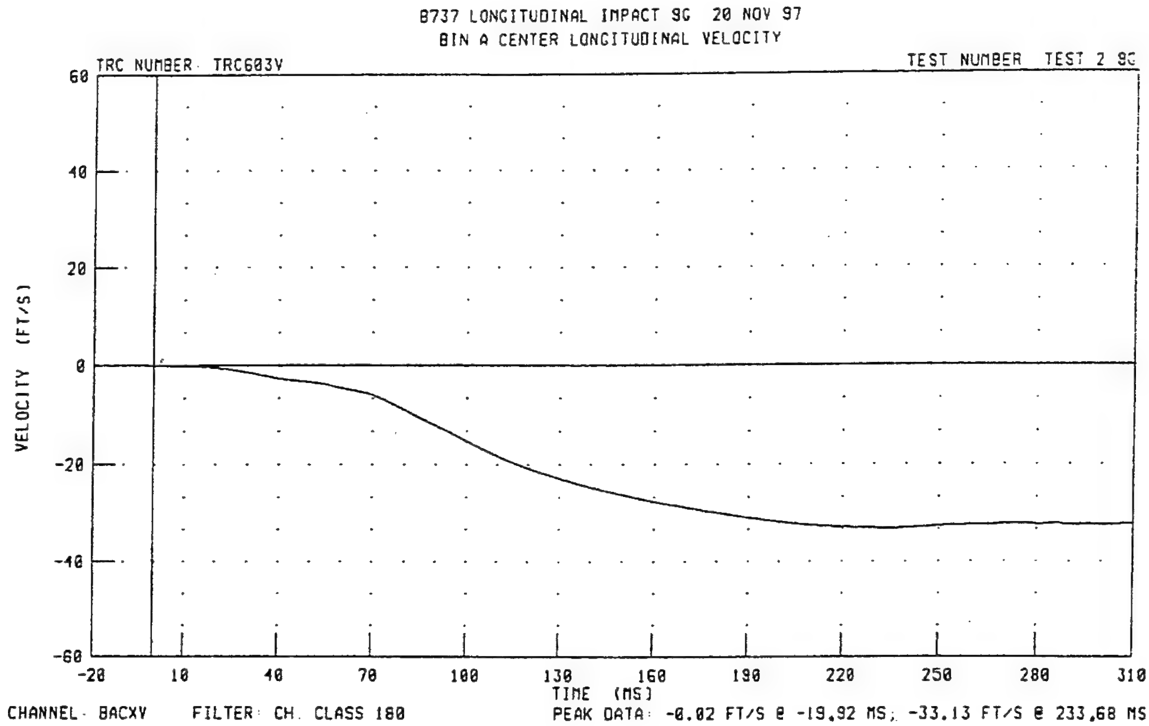
CHANNEL: BAFZG FILTER: CH. CLASS 60 PEAK DATA: 1.66 G @ 165.12 MS; -2.84 G @ 303.76 MS

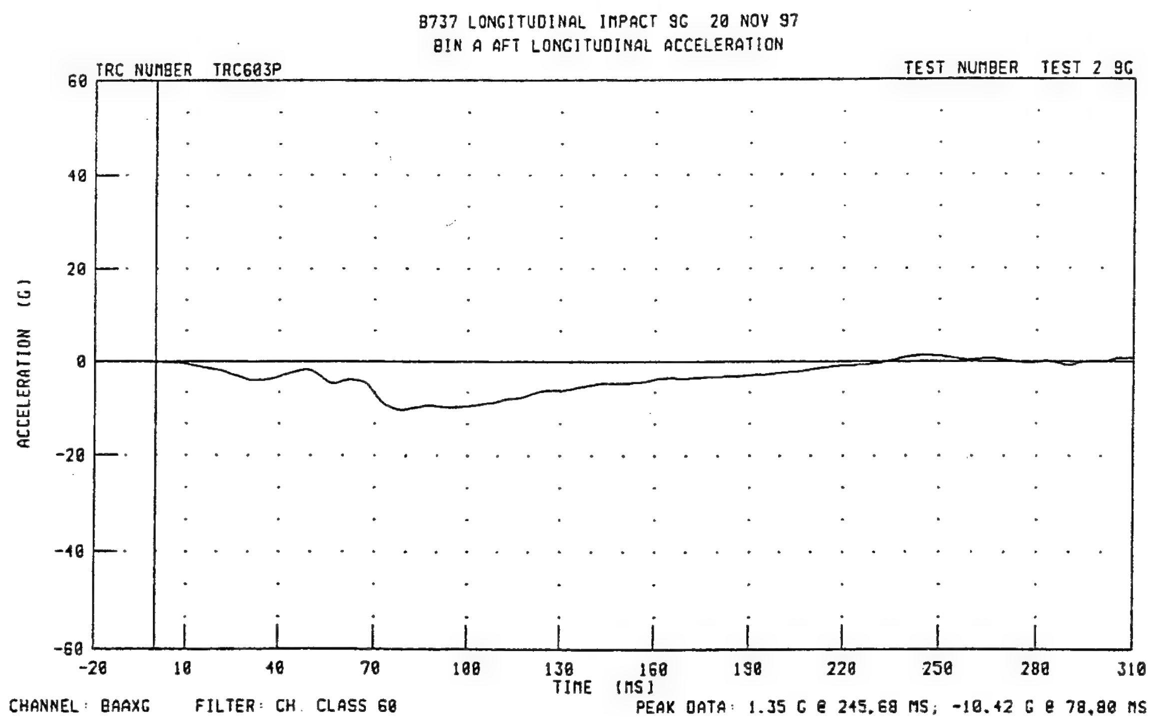

B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN A FRONT LONGITUDINAL VELOCITY
TRC NUMBER: TRC603V
TEST NUMBER: TEST 2 9G
VELOCITY (FT/S)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BAFXV
FILTER: CH. CLASS 180
PEAK DATA: -0.01 FT/S @ -19.28 MS; -33.50 FT/S @ 233.44 MS

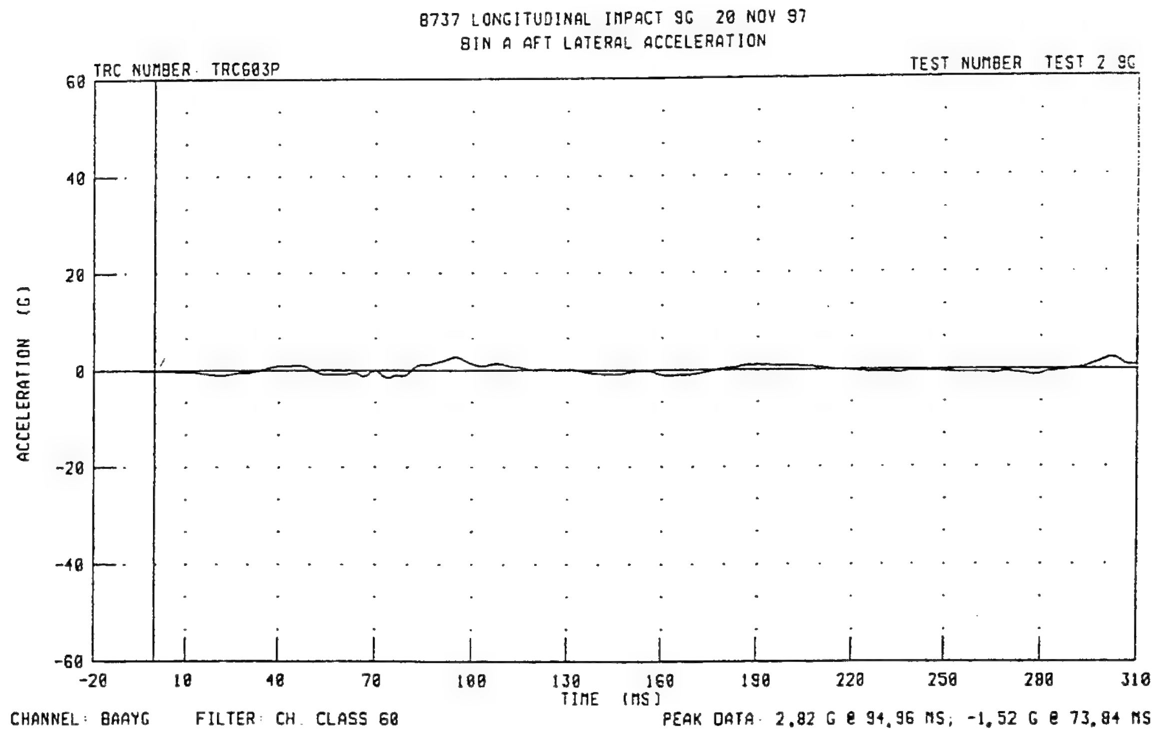

B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN A CENTER LONGITUDINAL ACCELERATION
TRC NUMBER: TRC603P
TEST NUMBER TEST 2 9G
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BACXG
FILTER: CH. CLASS 60
PEAK DATA: 1.29 G @ 247.04 MS; -10.31 G @ 78.80 MS

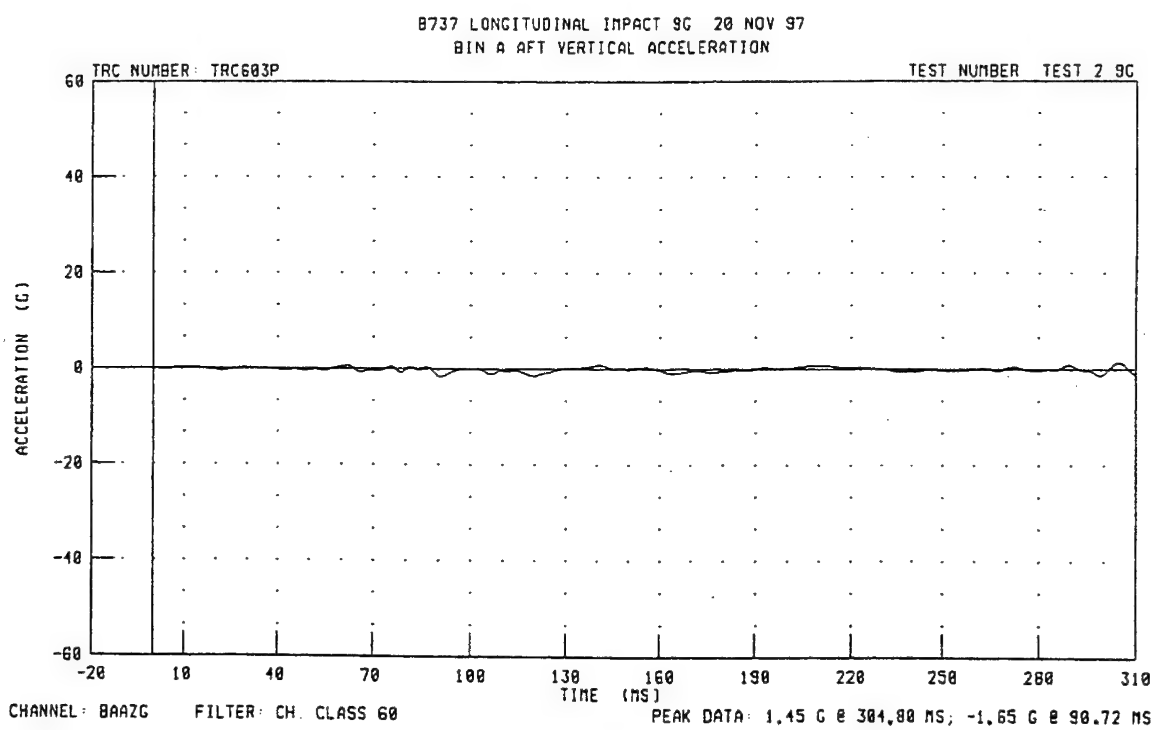

B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN A CENTER LATERAL ACCELERATION
TRC NUMBER: TRC603P
TEST NUMBER TEST 2 9G
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BACYG
FILTER: CH. CLASS 60
PEAK DATA 0.91 G @ 111.68 MS; -0.60 G @ 267.12 MS

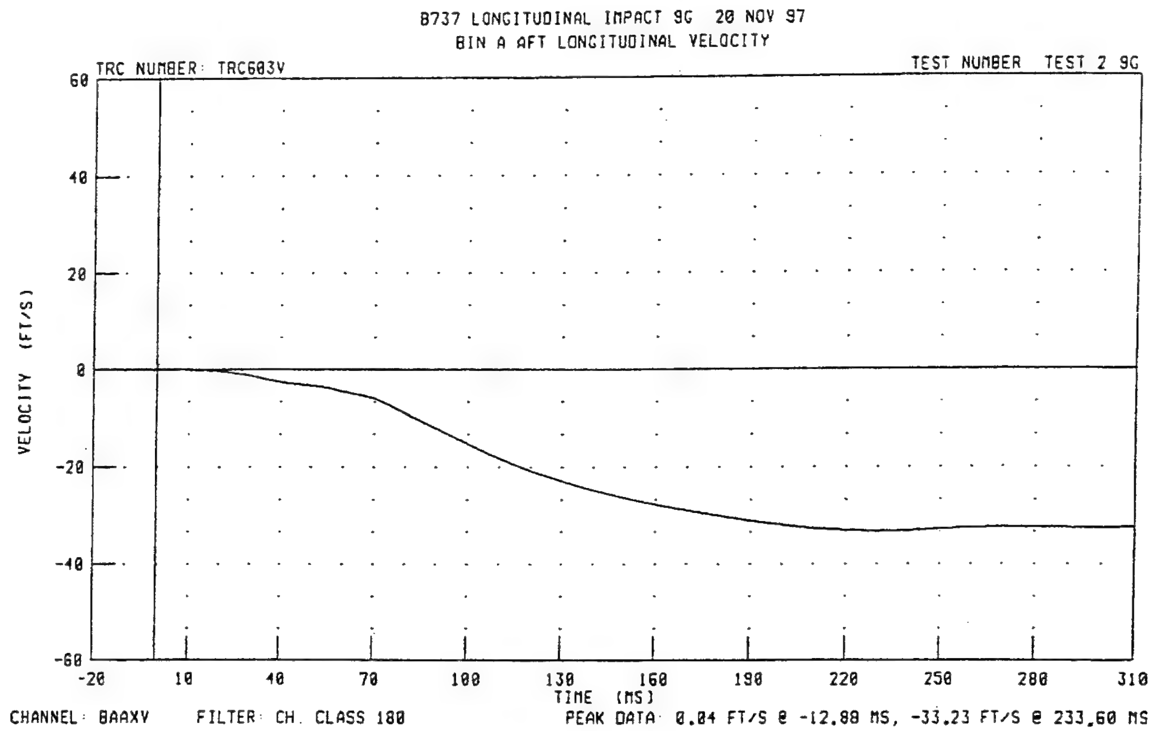

B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN A CENTER VERTICAL ACCELERATION
TRC NUMBER: TRC603P
TEST NUMBER TEST 2 9G
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BACZG
FILTER: CH. CLASS 60
PEAK DATA: 0.69 G @ 96.08 MS; -1.08 G @ 78.96 MS

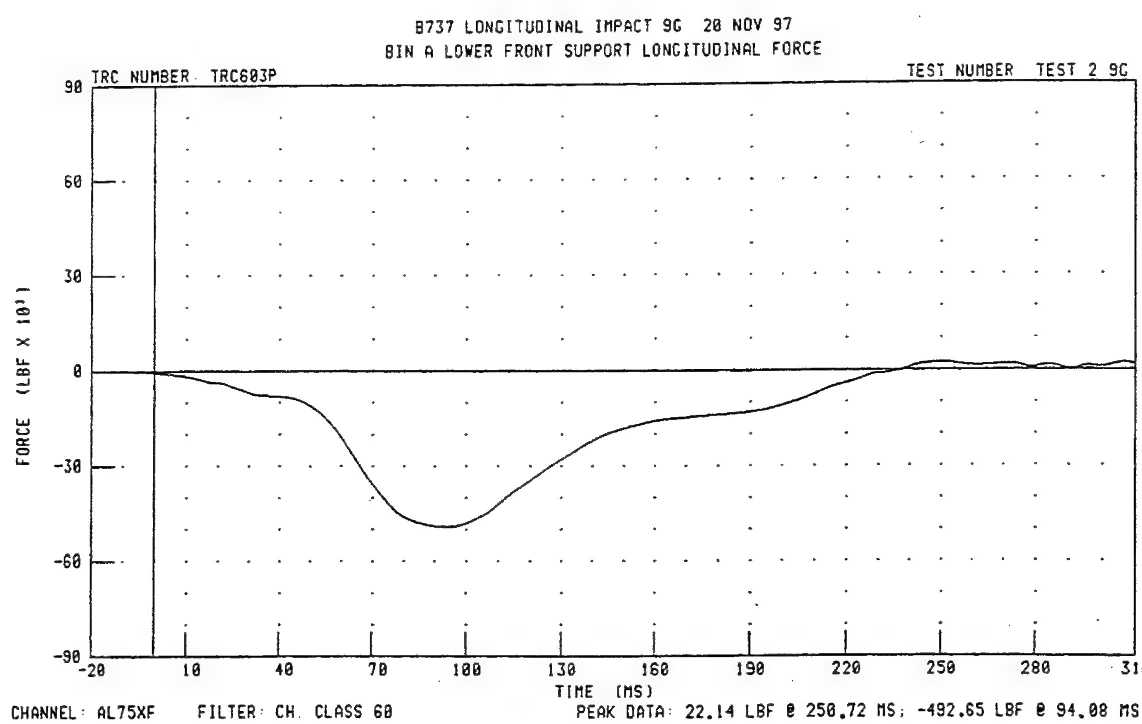

B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN A CENTER LONGITUDINAL VELOCITY
TRC NUMBER TRC603V
TEST NUMBER TEST 2 9G
VELOCITY (FT/S)
TIME (MS)
CHANNEL BACXV
FILTER CH. CLASS 180
PEAK DATA: -0.02 FT/S @ -19.92 MS; -33.13 FT/S @ 233.68 MS

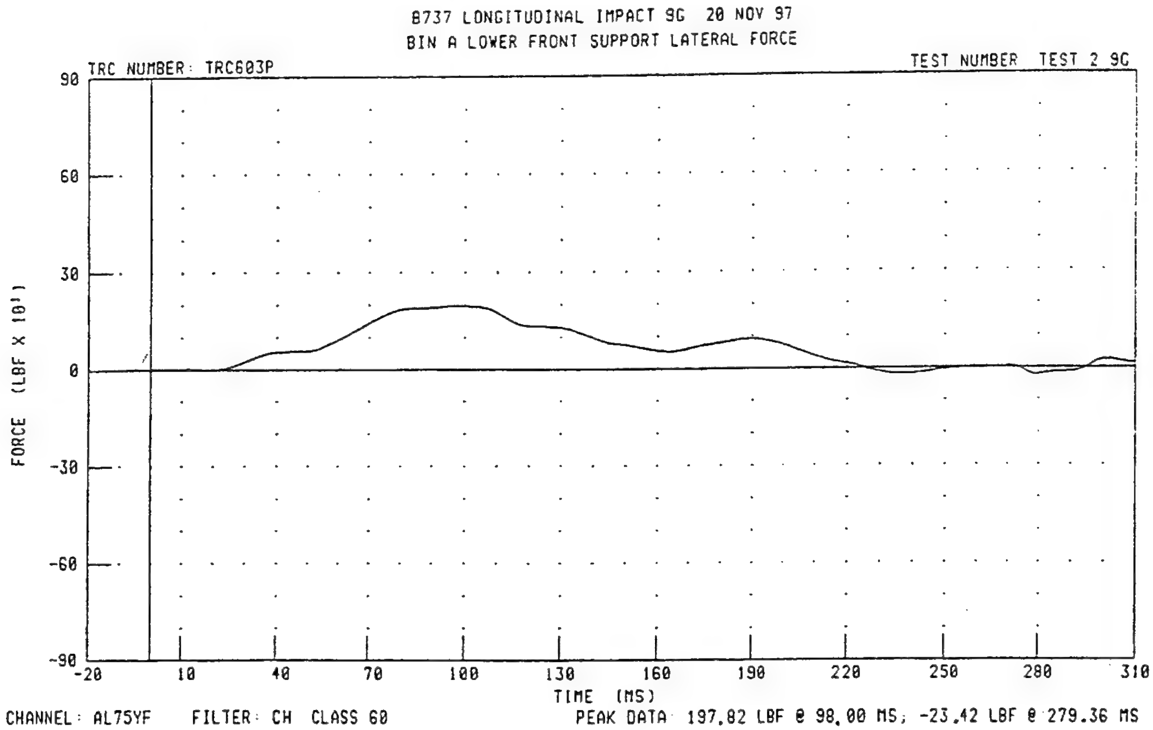

B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN A AFT LONGITUDINAL ACCELERATION
TRC NUMBER TRC603P
TEST NUMBER TEST 2 9G
ACCELERATION (G)
TIME (MS)
CHANNEL: BAAXG
FILTER: CH. CLASS 60
PEAK DATA: 1.35 G @ 245.68 MS; -10.42 G @ 78.80 MS

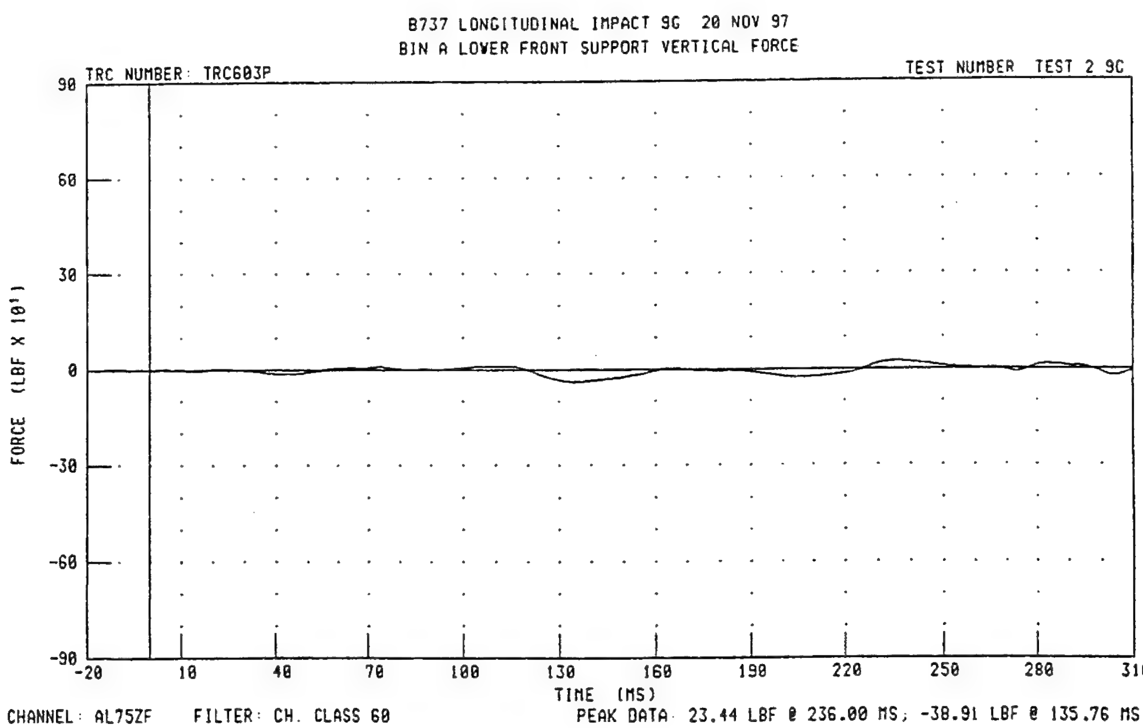

B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN A AFT LATERAL ACCELERATION
TRC NUMBER: TRC603P
TEST NUMBER TEST 2 9G
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BAAYG
FILTER: CH. CLASS 60
PEAK DATA: 2.82 G @ 94.96 MS; -1.52 G @ 73.84 MS

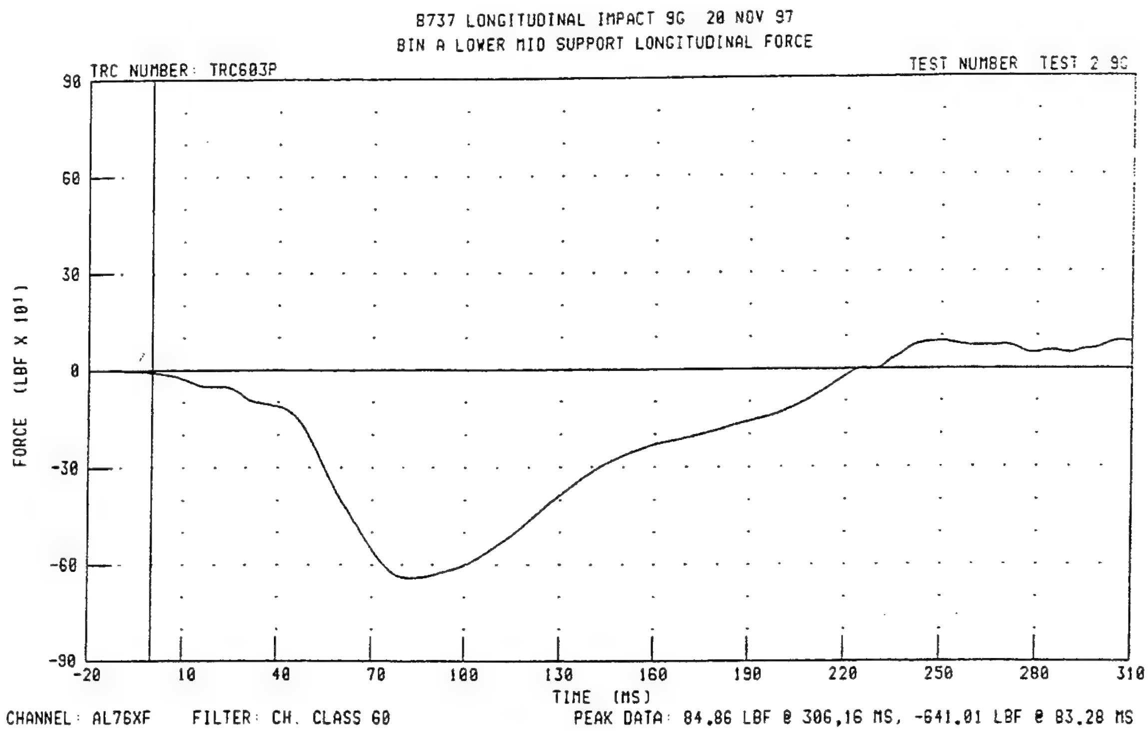

B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN A AFT VERTICAL ACCELERATION
TRC NUMBER: TRC603P
TEST NUMBER TEST 2 9G
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BAAZG
FILTER: CH. CLASS 60
PEAK DATA: 1.45 G @ 304.80 MS; -1.65 G @ 90.72 MS

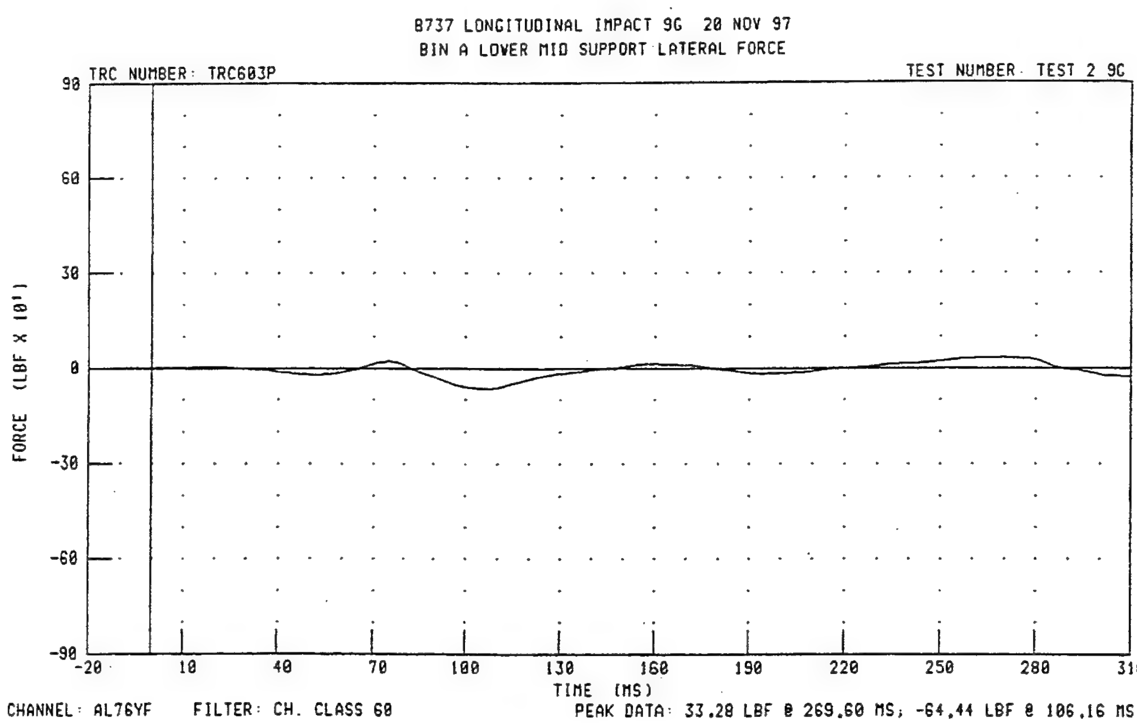

B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN A AFT LONGITUDINAL VELOCITY
TRC NUMBER: TRC603V
TEST NUMBER TEST 2 9G
VELOCITY (FT/S)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BAAXV
FILTER: CH. CLASS 180
PEAK DATA: 0.04 FT/S @ -12.88 MS, -33.23 FT/S @ 233.60 MS

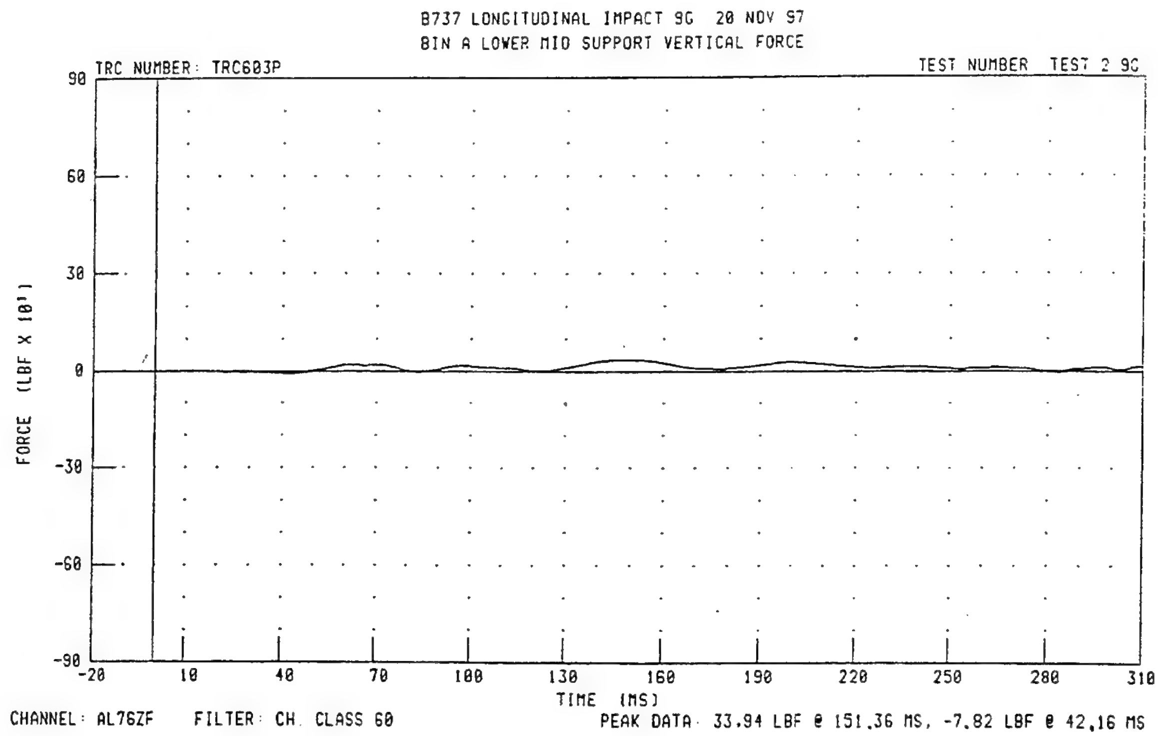

B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN A LOWER FRONT SUPPORT LONGITUDINAL FORCE
TRC NUMBER: TRC603P
TEST NUMBER TEST 2 9G
FORCE (LBF X 10¹)
90
60
30
0
-30
-60
-90
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: AL75XF
FILTER: CH. CLASS 60
PEAK DATA: 22.14 LBF @ 250.72 MS; -492.65 LBF @ 94.08 MS

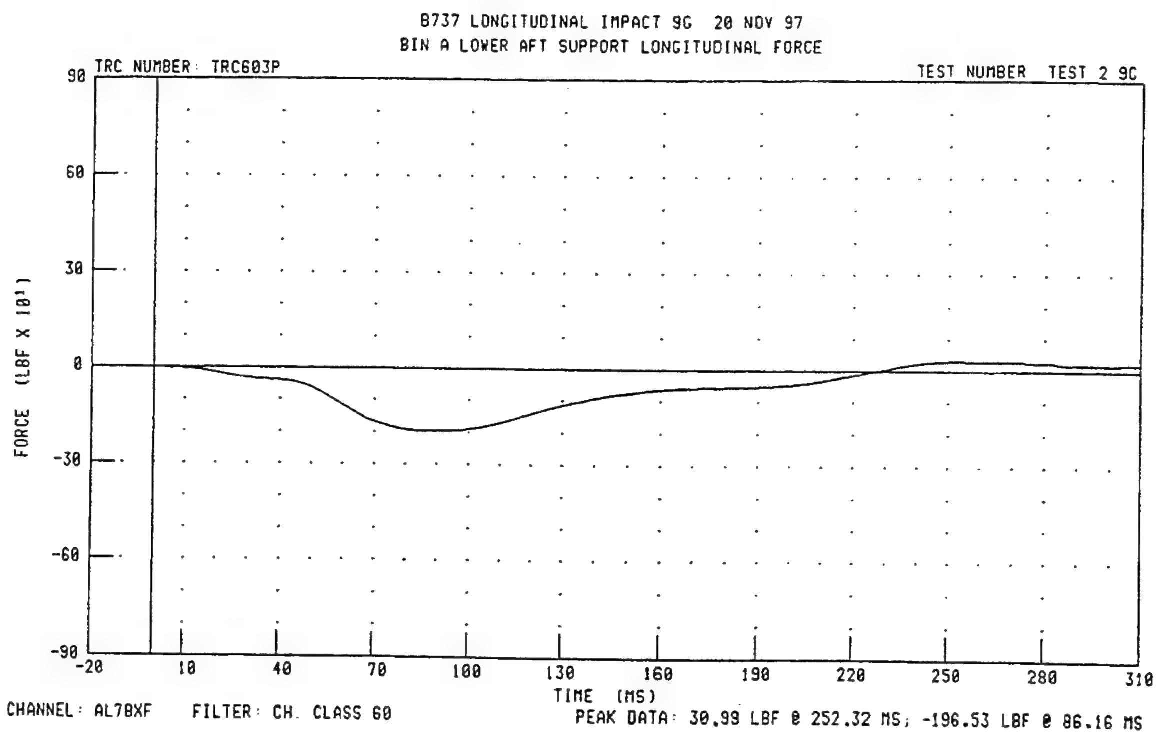

B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN A LOWER FRONT SUPPORT LATERAL FORCE
TRC NUMBER: TRC603P
TEST NUMBER TEST 2 9G
90
60
30
0
-30
-60
-90
FORCE (LBF X 10¹)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: AL75YF
FILTER: CH CLASS 60
PEAK DATA: 197.82 LBF @ 98.00 MS; -23.42 LBF @ 279.36 MS

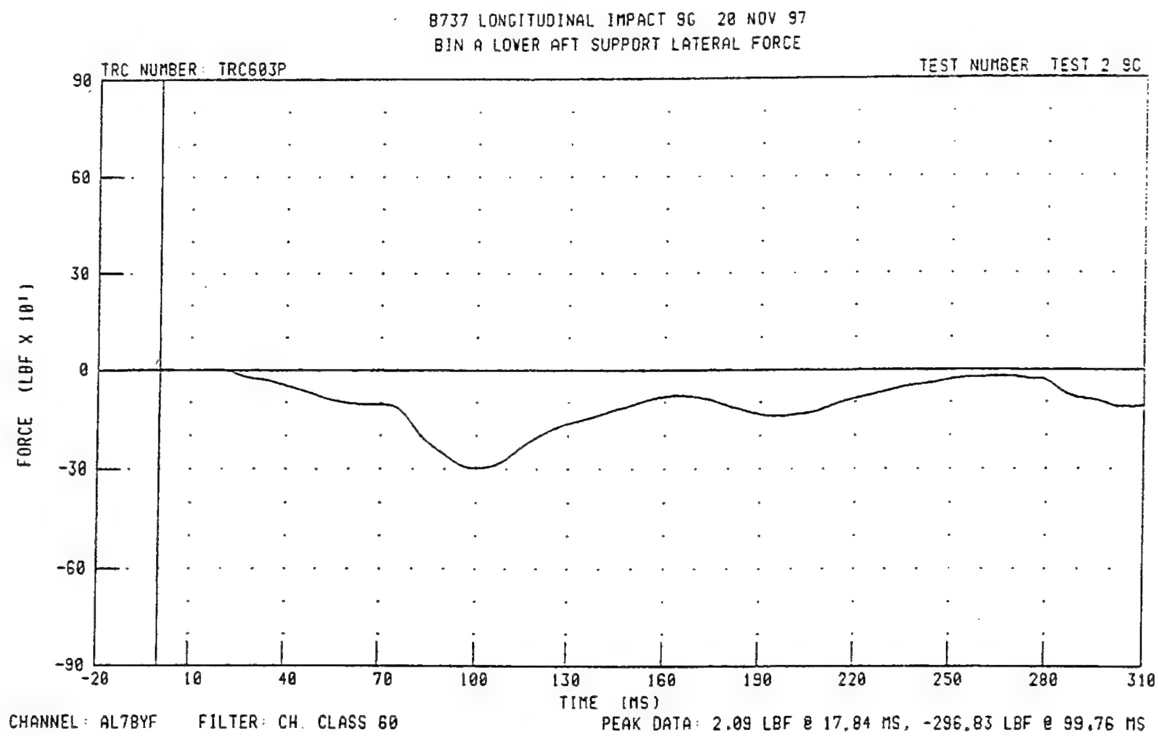

B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN A LOWER FRONT SUPPORT VERTICAL FORCE
TRC NUMBER: TRC603P
TEST NUMBER TEST 2 9G
90
60
30
0
-30
-60
-90
FORCE (LBF X 10¹)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: AL75ZF
FILTER: CH. CLASS 60
PEAK DATA: 23.44 LBF @ 236.00 MS; -38.91 LBF @ 135.76 MS

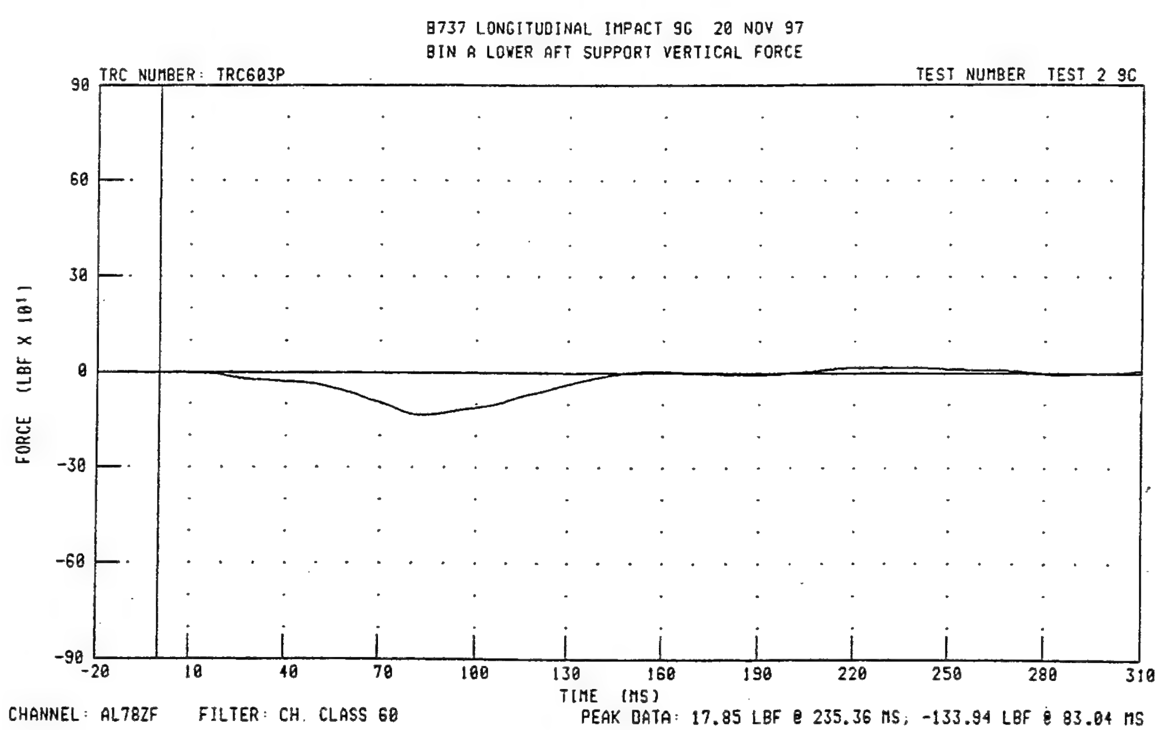

B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN A LOWER MID SUPPORT LONGITUDINAL FORCE
TRC NUMBER: TRC603P
TEST NUMBER TEST 2 9G
90
60
30
0
-30
-60
-90
FORCE (LBF X 10¹)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: AL76XF
FILTER: CH. CLASS 60
PEAK DATA: 84.86 LBF @ 306.16 MS, -641.01 LBF @ 83.28 MS

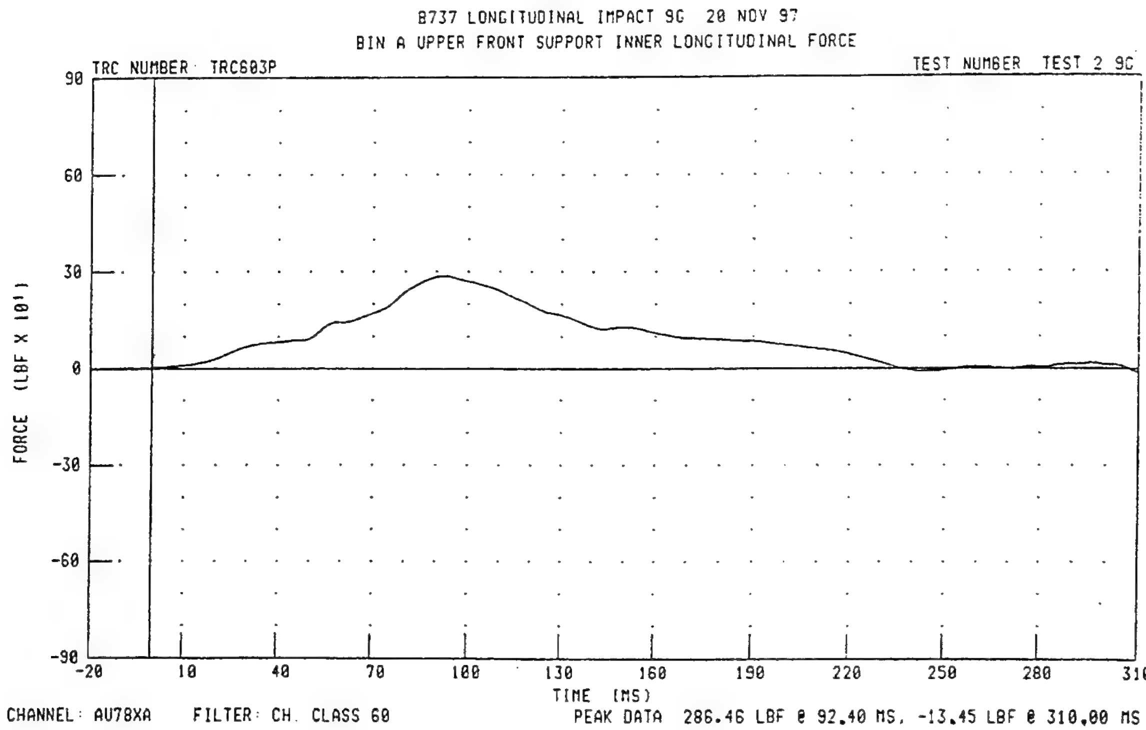

B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN A LOWER MID SUPPORT LATERAL FORCE
TRC NUMBER: TRC603P
TEST NUMBER: TEST 2 9G
90
60
30
0
-30
-60
-90
FORCE (LBF X 10¹)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: AL76YF
FILTER: CH. CLASS 60
PEAK DATA: 33.28 LBF @ 269.60 MS; -64.44 LBF @ 106.16 MS

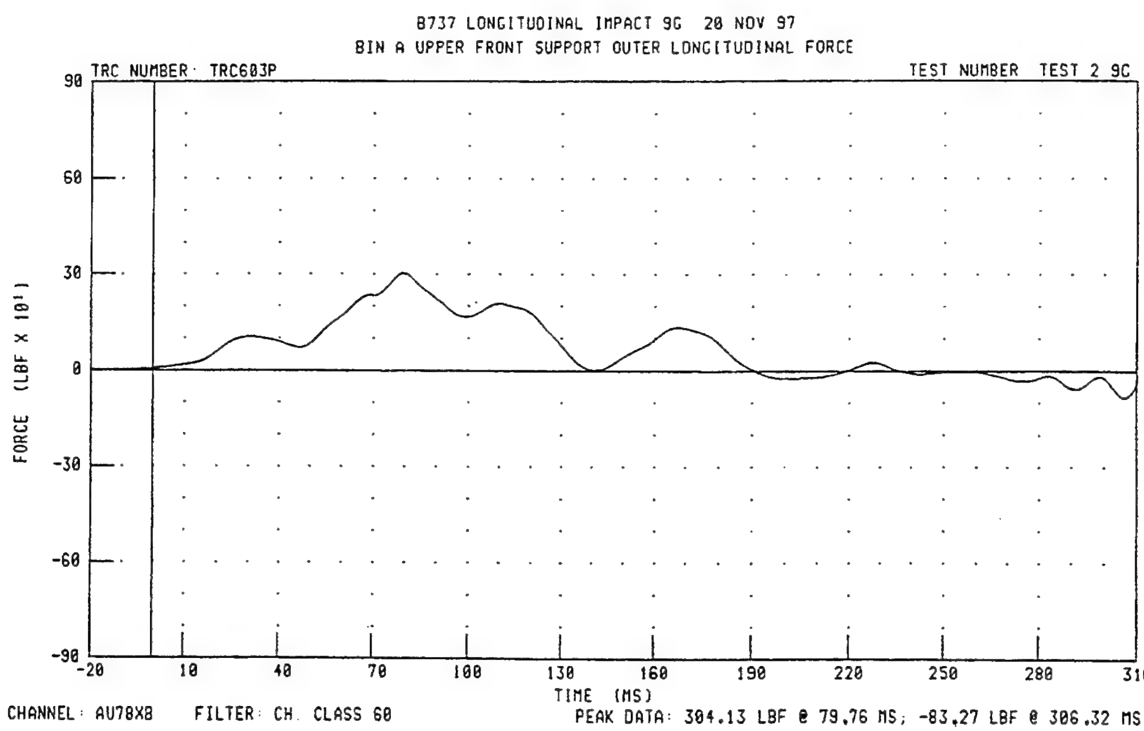

B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN A LOWER MID SUPPORT VERTICAL FORCE
TRC NUMBER: TRC603P
TEST NUMBER TEST 2 9G
FORCE (LBF X 10¹)
90
60
30
0
-30
-60
-90
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: AL76ZF
FILTER: CH. CLASS 60
PEAK DATA: 33.94 LBF @ 151.36 MS, -7.82 LBF @ 42.16 MS

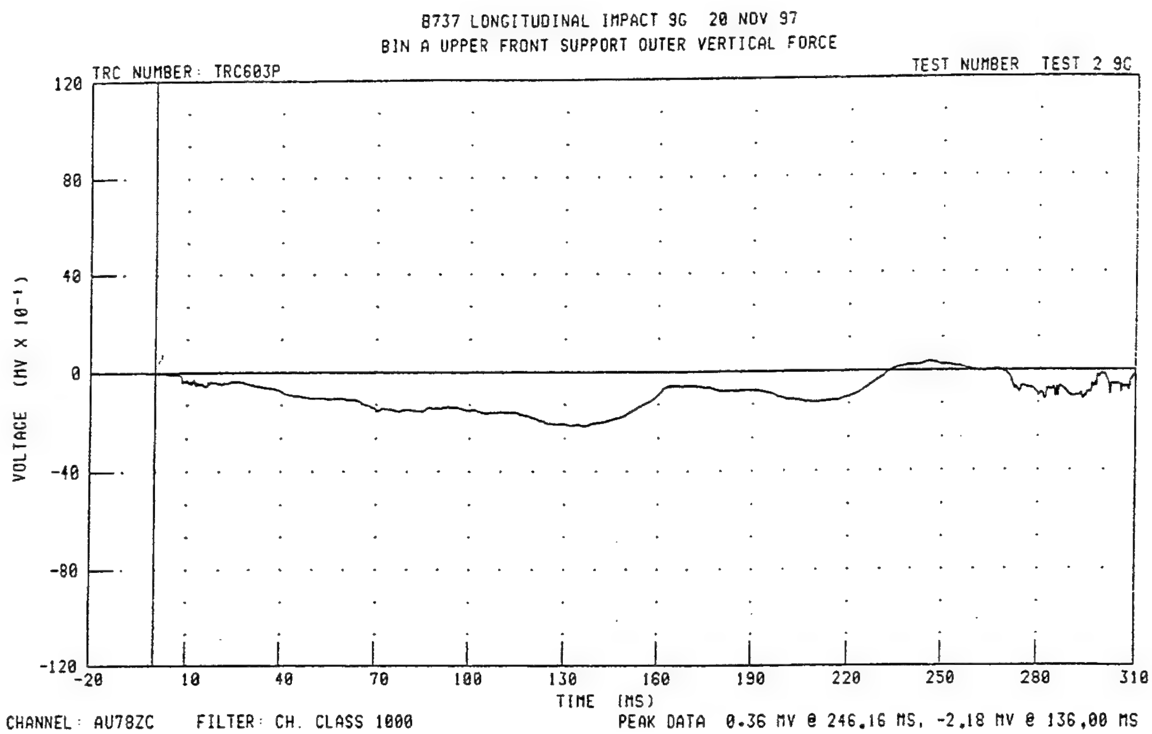

B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN A LOWER AFT SUPPORT LONGITUDINAL FORCE
TRC NUMBER: TRC603P
TEST NUMBER TEST 2 9G
FORCE (LBF X 10¹)
90
60
30
0
-30
-60
-90
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: AL78XF
FILTER: CH. CLASS 60
PEAK DATA: 30.99 LBF @ 252.32 MS; -196.53 LBF @ 86.16 MS

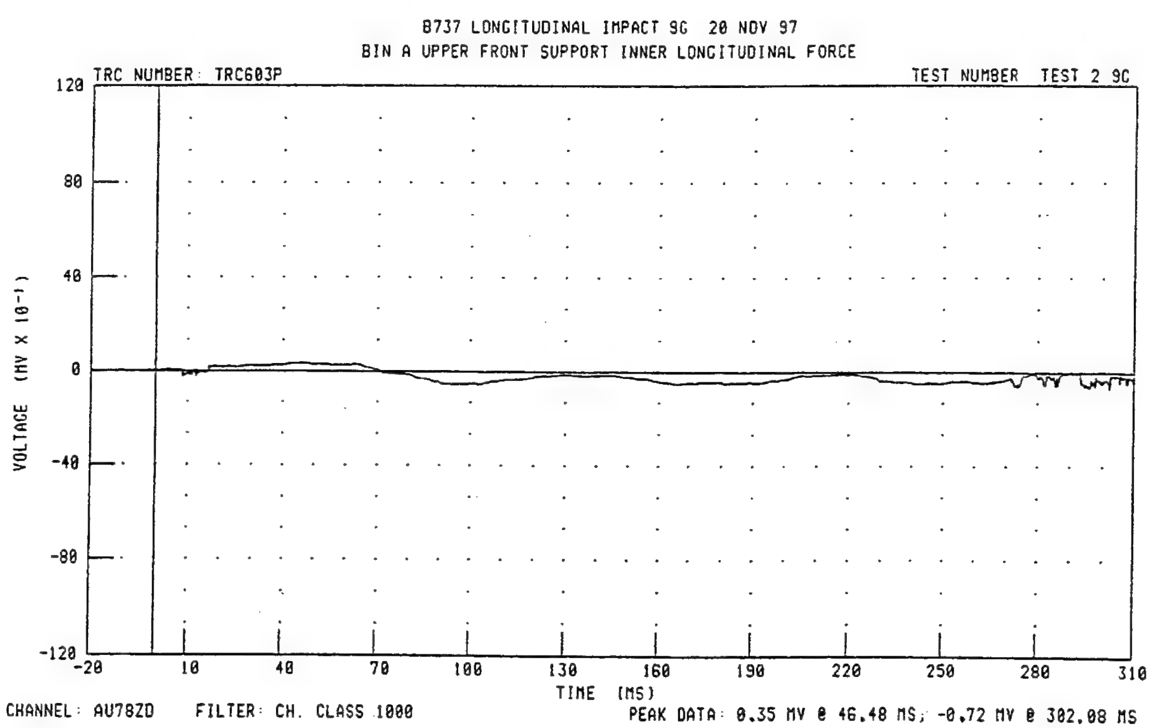

B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN A LOWER AFT SUPPORT LATERAL FORCE
TRC NUMBER: TRC603P
TEST NUMBER TEST 2 9C
FORCE (LBF X 10¹)
TIME (MS)
CHANNEL: AL78YF
FILTER: CH. CLASS 60
PEAK DATA: 2.09 LBF @ 17.84 MS, -296.83 LBF @ 99.76 MS

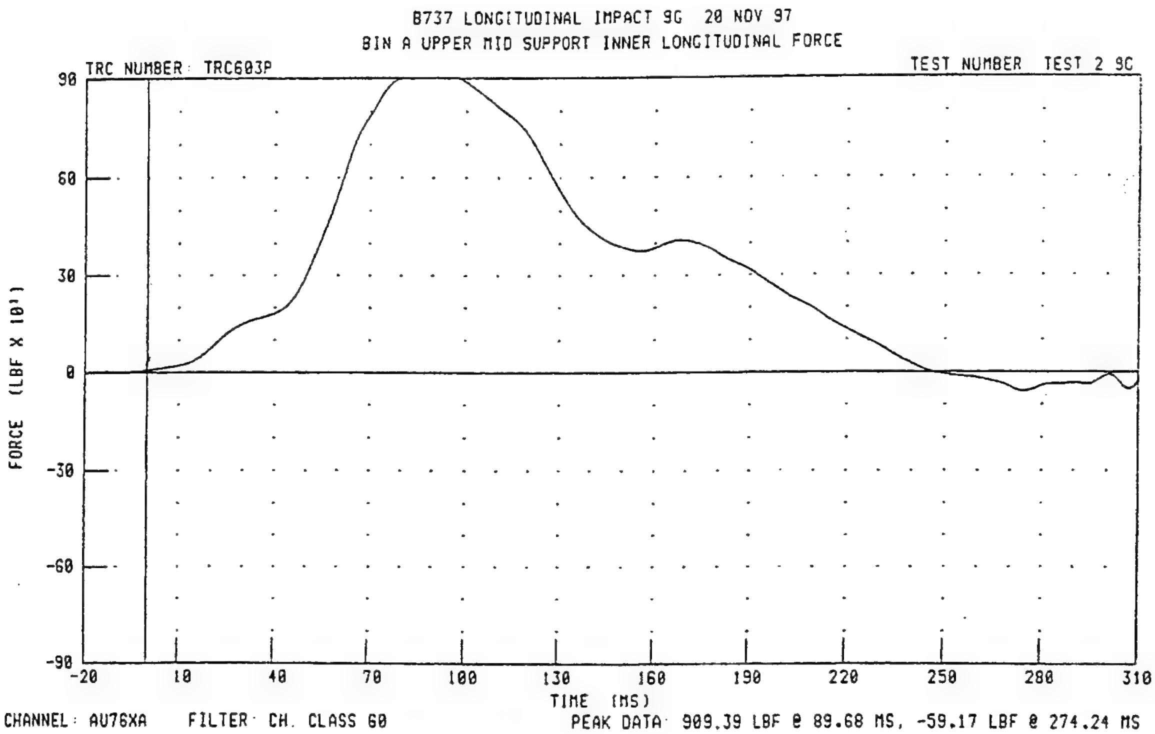

B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN A LOWER AFT SUPPORT VERTICAL FORCE
TRC NUMBER: TRC603P
TEST NUMBER TEST 2 9C
FORCE (LBF X 10¹)
TIME (MS)
CHANNEL: AL78ZF
FILTER: CH. CLASS 60
PEAK DATA: 17.85 LBF @ 235.36 MS, -133.94 LBF @ 83.04 MS

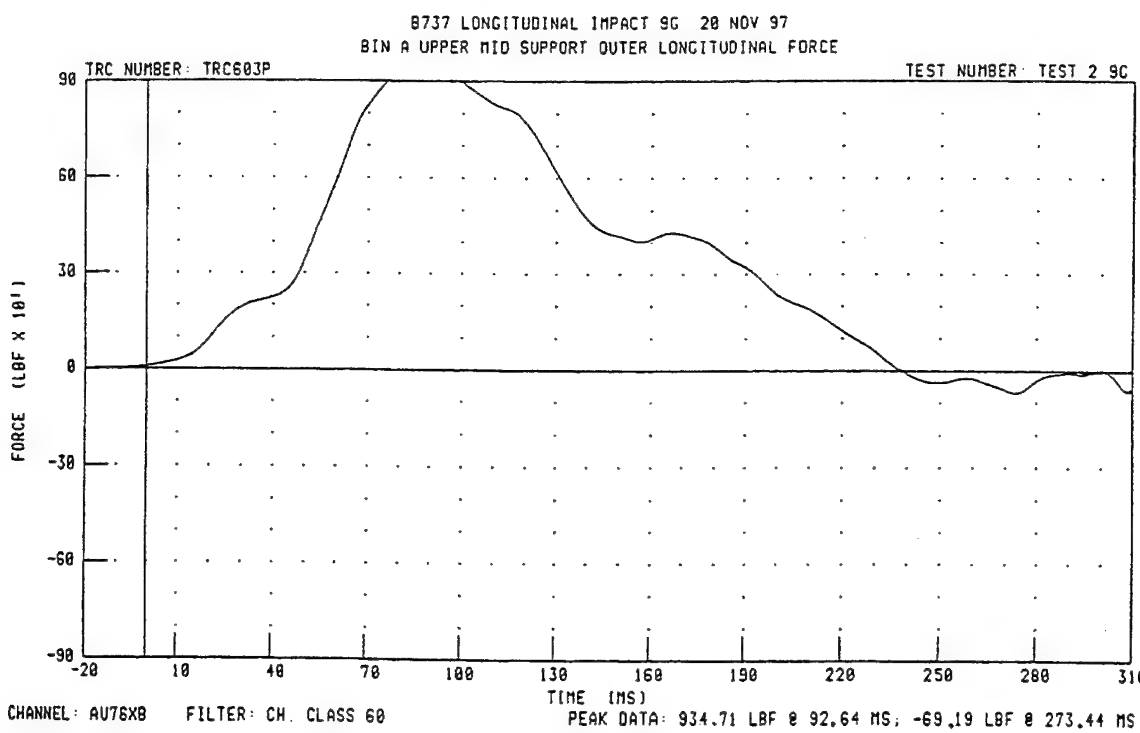

B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN A UPPER FRONT SUPPORT INNER LONGITUDINAL FORCE
TRC NUMBER: TRC603P
TEST NUMBER TEST 2 9G
90
60
30
0
-30
-60
-90
FORCE (LBF X 10¹)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: AU78XA
FILTER: CH. CLASS 60
PEAK DATA 286.46 LBF @ 92.40 MS, -13.45 LBF @ 310.00 MS

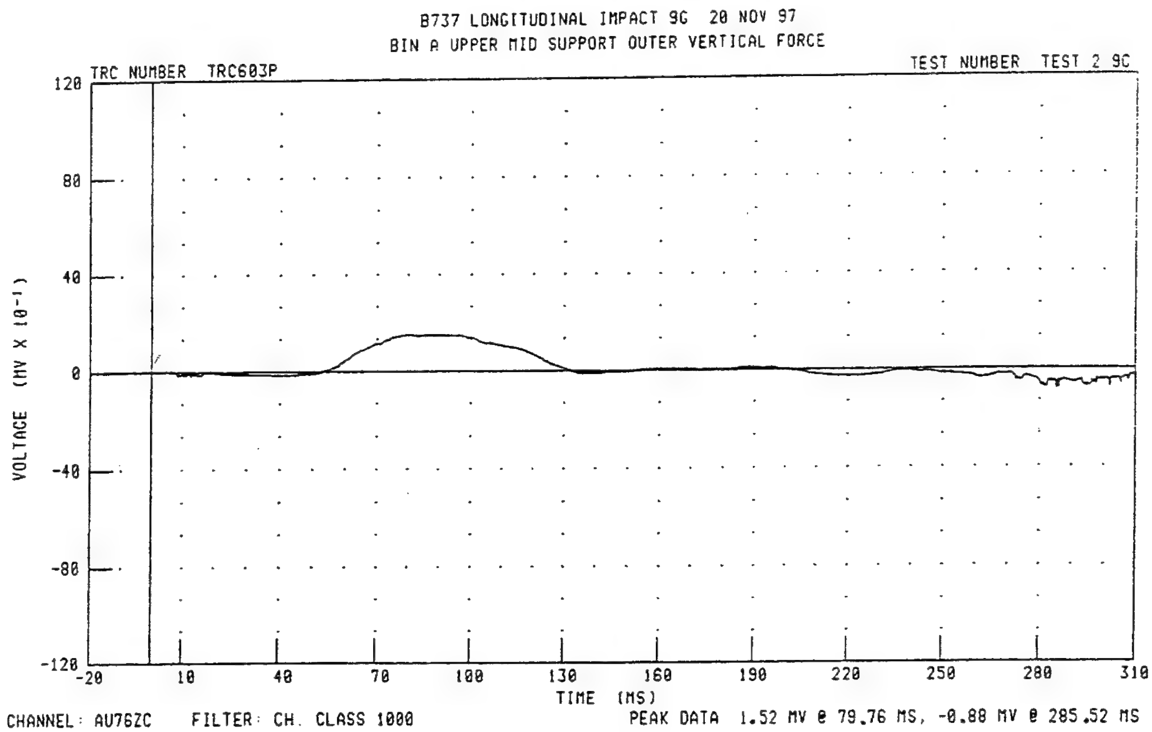

B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN A UPPER FRONT SUPPORT OUTER LONGITUDINAL FORCE
TRC NUMBER: TRC603P
TEST NUMBER TEST 2 9G
90
60
30
0
-30
-60
-90
FORCE (LBF X 10¹)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: AU78XB
FILTER: CH. CLASS 60
PEAK DATA: 304.13 LBF @ 79.76 MS; -83.27 LBF @ 306.32 MS

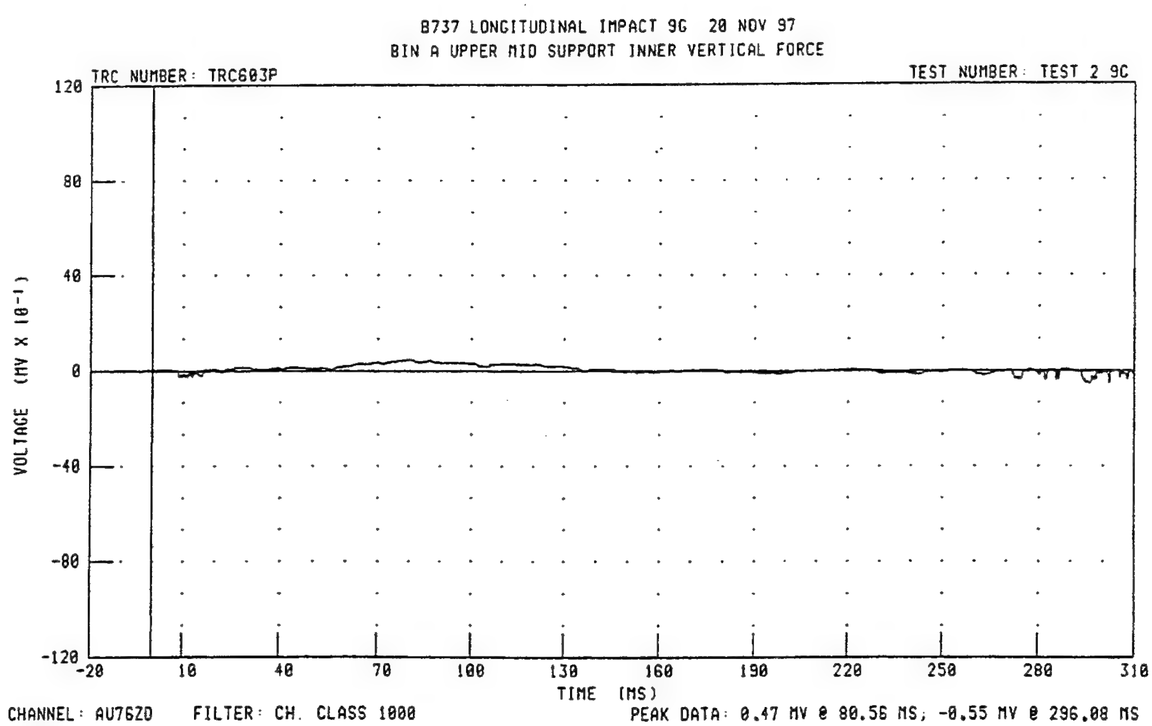

B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN A UPPER FRONT SUPPORT OUTER VERTICAL FORCE
TRC NUMBER: TRC603P
TEST NUMBER TEST 2 9G
VOLTAGE (MV X 10⁻¹)
120
80
40
0
-40
-80
-120
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: AU78ZC
FILTER: CH. CLASS 1000
PEAK DATA 0.36 MV @ 246.16 MS, -2.18 MV @ 136.00 MS

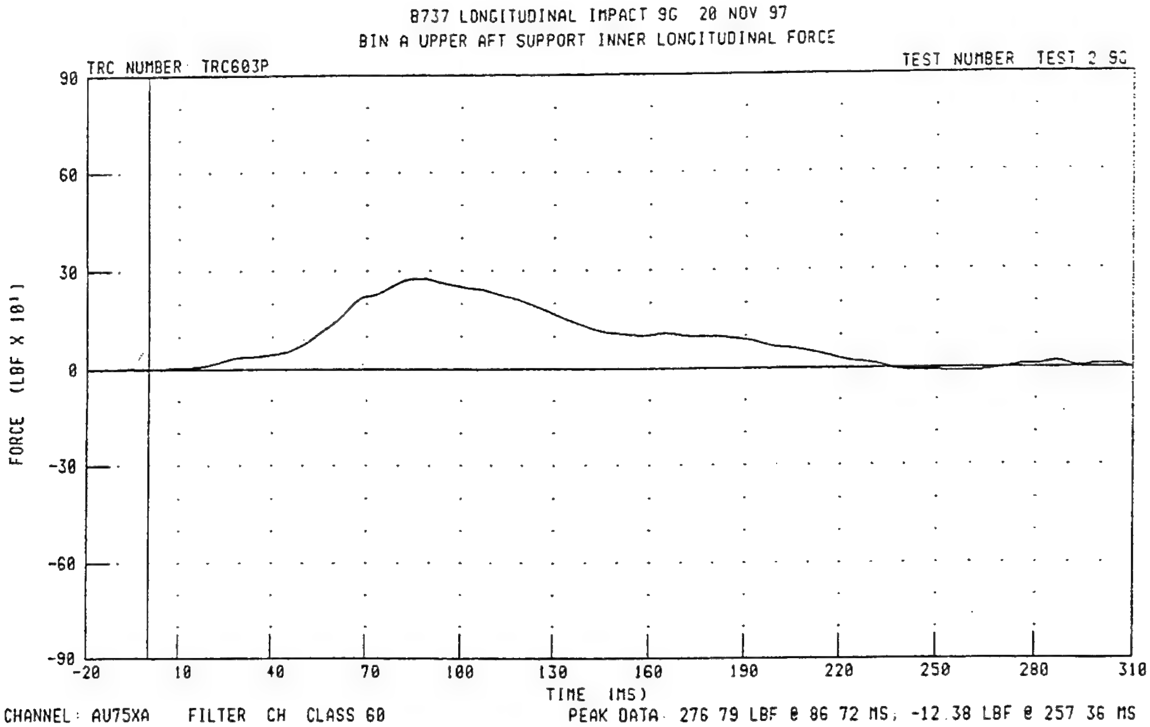

B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN A UPPER FRONT SUPPORT INNER LONGITUDINAL FORCE
TRC NUMBER: TRC603P
TEST NUMBER TEST 2 9G
VOLTAGE (MV X 10⁻¹)
120
80
40
0
-40
-80
-120
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: AU78ZD
FILTER: CH. CLASS 1000
PEAK DATA: 0.35 MV @ 46.48 MS, -0.72 MV @ 302.08 MS

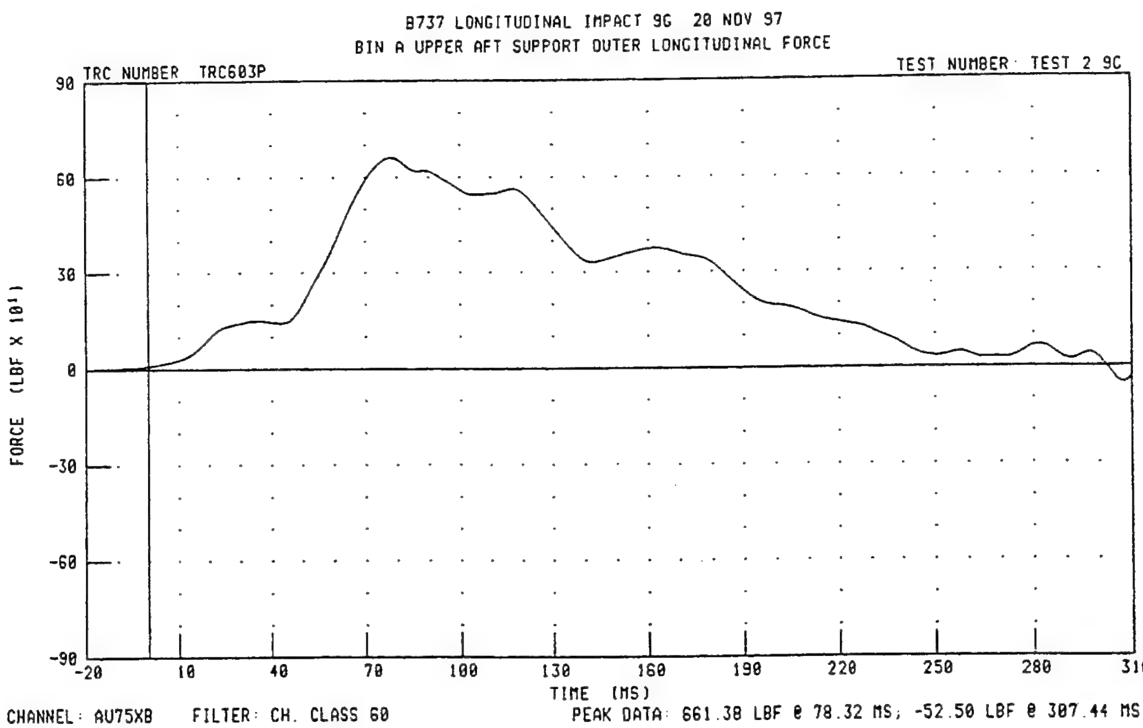

B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN A UPPER MID SUPPORT INNER LONGITUDINAL FORCE
TRC NUMBER: TRC603P
TEST NUMBER TEST 2 9C
90
60
30
0
-30
-60
-90
FORCE (LBF X 10^1)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: AU76XA
FILTER: CH. CLASS 60
PEAK DATA: 909.39 LBF @ 89.68 MS, -59.17 LBF @ 274.24 MS

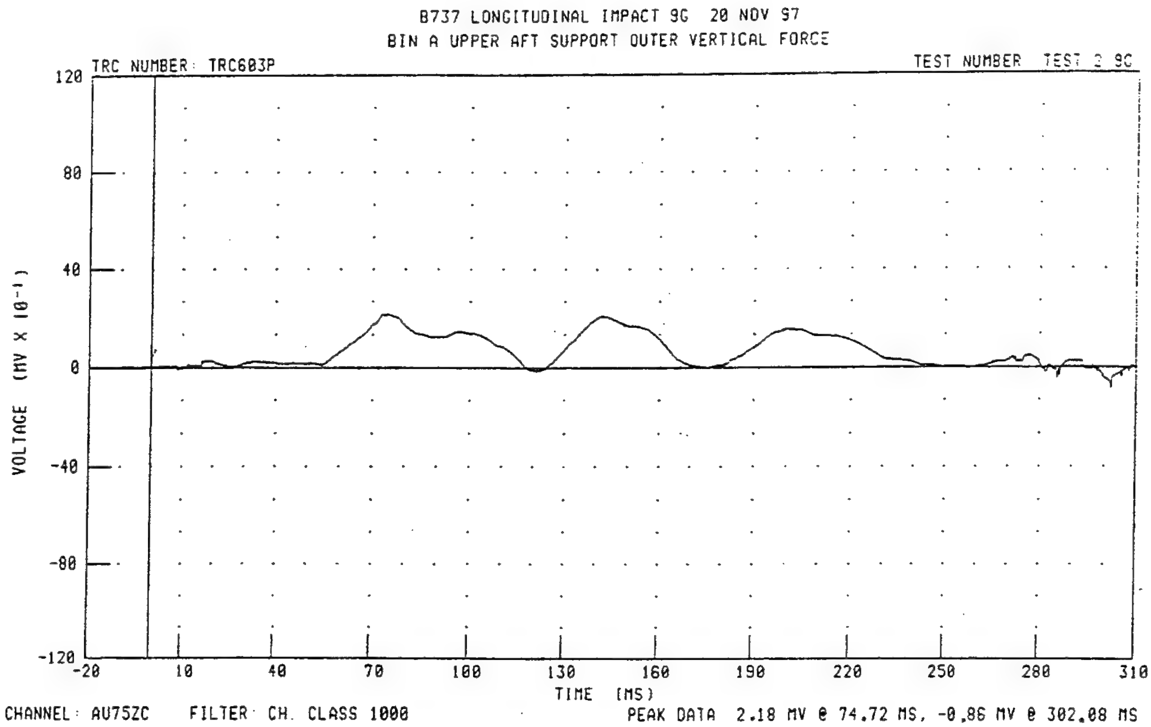

B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN A UPPER MID SUPPORT OUTER LONGITUDINAL FORCE
TRC NUMBER: TRC603P
TEST NUMBER: TEST 2 9C
90
60
30
0
-30
-60
-90
FORCE (LBF X 10^1)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: AU76XB
FILTER: CH. CLASS 60
PEAK DATA: 934.71 LBF @ 92.64 MS; -69.19 LBF @ 273.44 MS

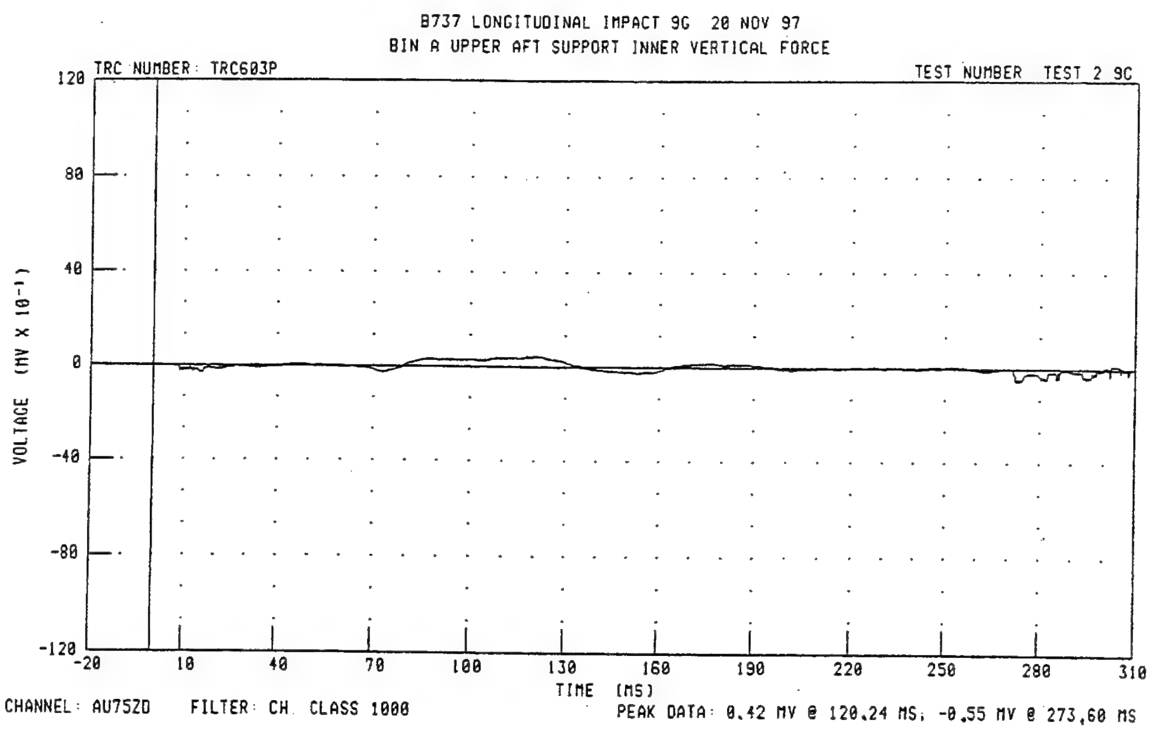

B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN A UPPER MID SUPPORT OUTER VERTICAL FORCE
TRC NUMBER TRC603P
TEST NUMBER TEST 2 9C
120
80
40
0
-40
-80
-120
VOLTAGE (MV X 10⁻¹)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: AU76ZC
FILTER: CH. CLASS 1000
PEAK DATA 1.52 MV @ 79.76 MS, -0.88 MV @ 285.52 MS

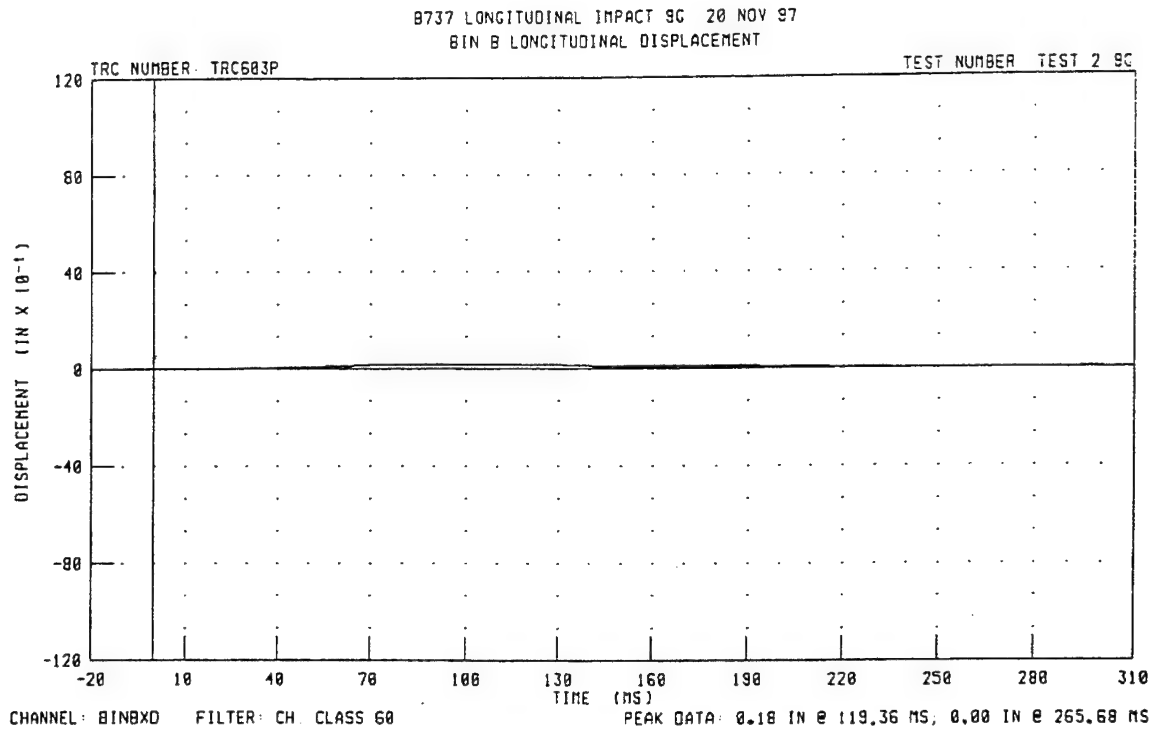

B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN A UPPER MID SUPPORT INNER VERTICAL FORCE
TRC NUMBER: TRC603P
TEST NUMBER: TEST 2 9C
120
80
40
0
-40
-80
-120
VOLTAGE (MV X 10⁻¹)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: AU76ZD
FILTER: CH. CLASS 1000
PEAK DATA: 0.47 MV @ 80.56 MS; -0.55 MV @ 296.08 MS


B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN A UPPER AFT SUPPORT INNER LONGITUDINAL FORCE
TRC NUMBER: TRC603P
TEST NUMBER: TEST 2 9G
FORCE (LBF X 10¹)
TIME (MS)
CHANNEL: AU75XA FILTER: CH CLASS 60
PEAK DATA: 276.79 LBF @ 86.72 MS; -12.38 LBF @ 257.36 MS

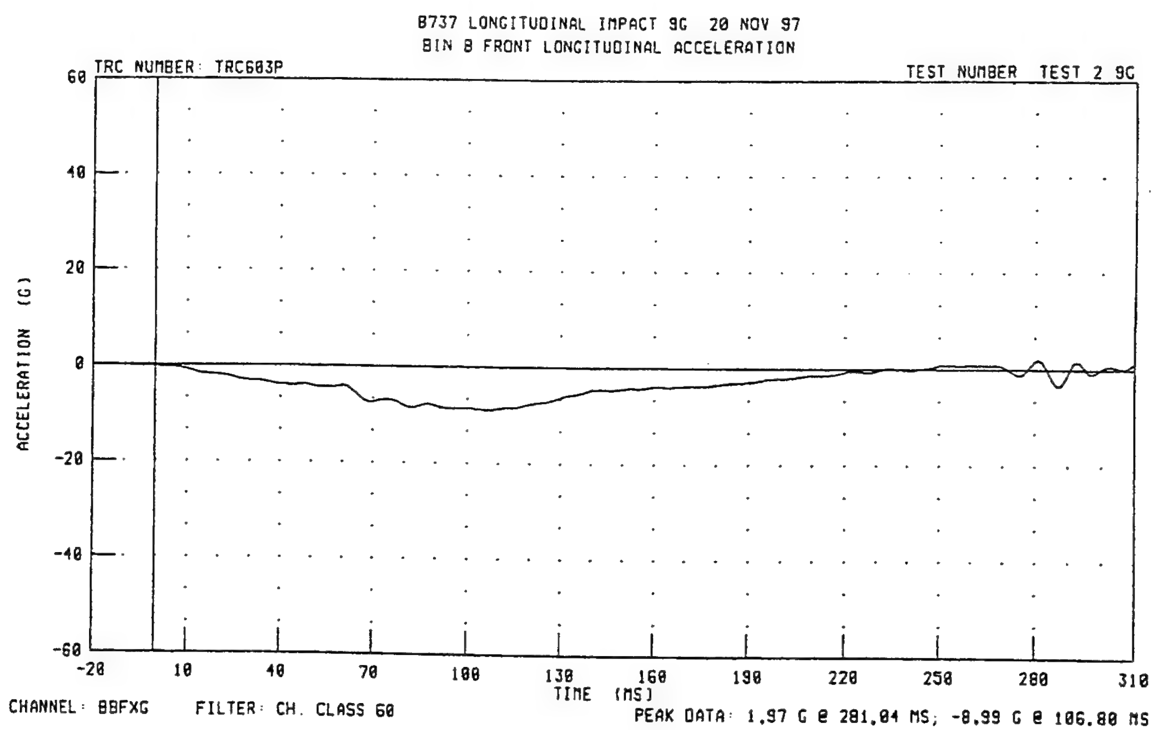

B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN A UPPER AFT SUPPORT OUTER LONGITUDINAL FORCE
TRC NUMBER: TRC603P
TEST NUMBER: TEST 2 9C
FORCE (LBF X 10¹)
TIME (MS)
CHANNEL: AU75XB FILTER: CH. CLASS 60
PEAK DATA: 661.38 LBF @ 78.32 MS; -52.50 LBF @ 307.44 MS


B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN A UPPER AFT SUPPORT OUTER VERTICAL FORCE
TRC NUMBER: TRC603P
TEST NUMBER TEST 2 9C
VOLTAGE (MV X 10⁻¹)
120
80
40
0
-40
-80
-120
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: AU75ZC
FILTER: CH. CLASS 1000
PEAK DATA 2.18 MV @ 74.72 MS, -0.86 MV @ 302.08 MS


B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN A UPPER AFT SUPPORT INNER VERTICAL FORCE
TRC NUMBER: TRC603P
TEST NUMBER TEST 2 9C
VOLTAGE (MV X 10⁻¹)
120
80
40
0
-40
-80
-120
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: AU75ZD
FILTER: CH. CLASS 1000
PEAK DATA: 0.42 MV @ 120.24 MS, -0.55 MV @ 273.60 MS

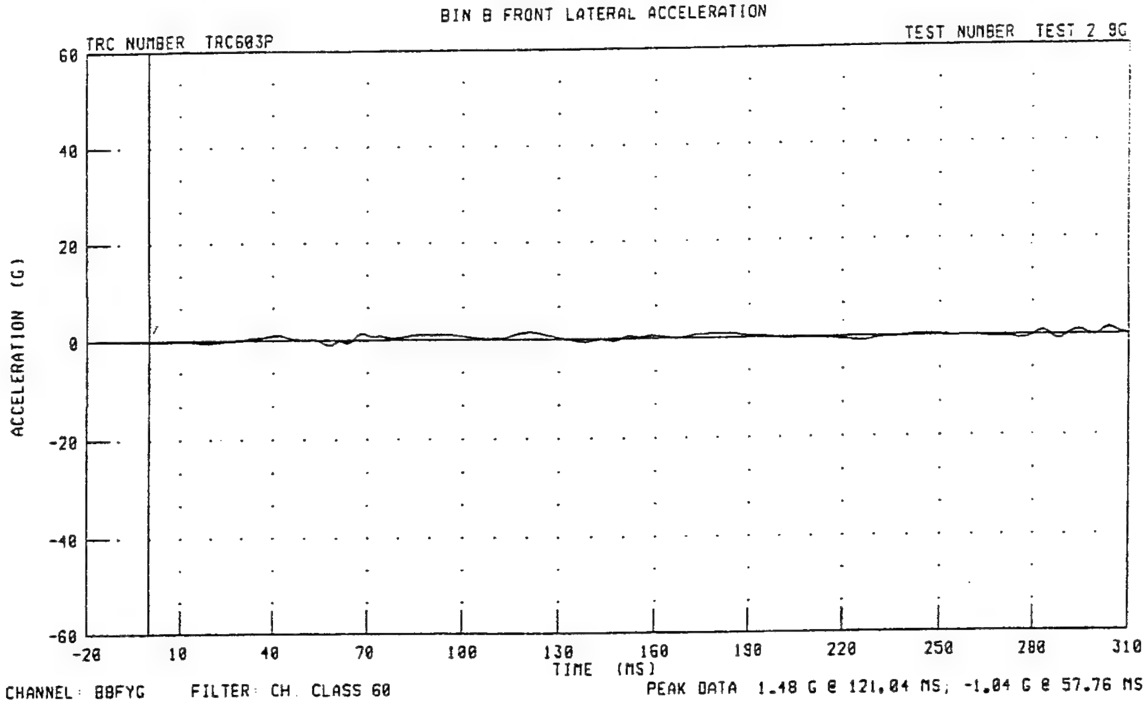


B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN 8 LONGITUDINAL DISPLACEMENT
TRC NUMBER: TRC683P
TEST NUMBER TEST 2 9G
DISPLACEMENT (IN X 10⁻¹)
120
80
40
0
-40
-80
-120
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BIN8XD FILTER: CH. CLASS 60
PEAK DATA: 0.18 IN @ 119.36 MS; 0.00 IN @ 265.68 MS

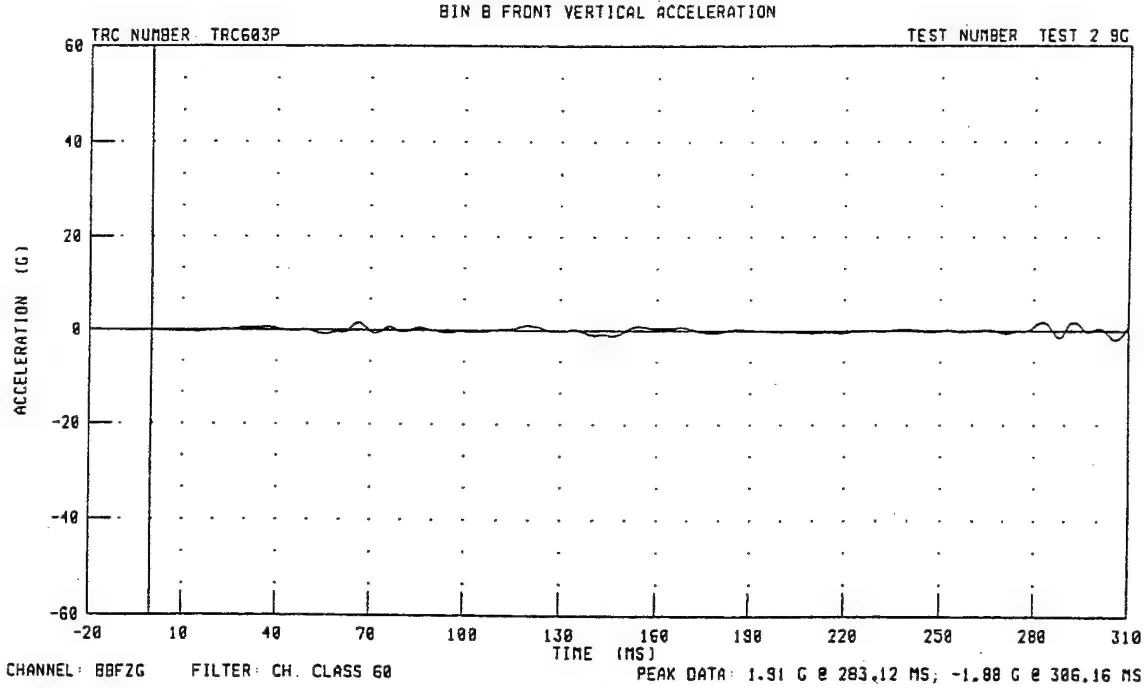


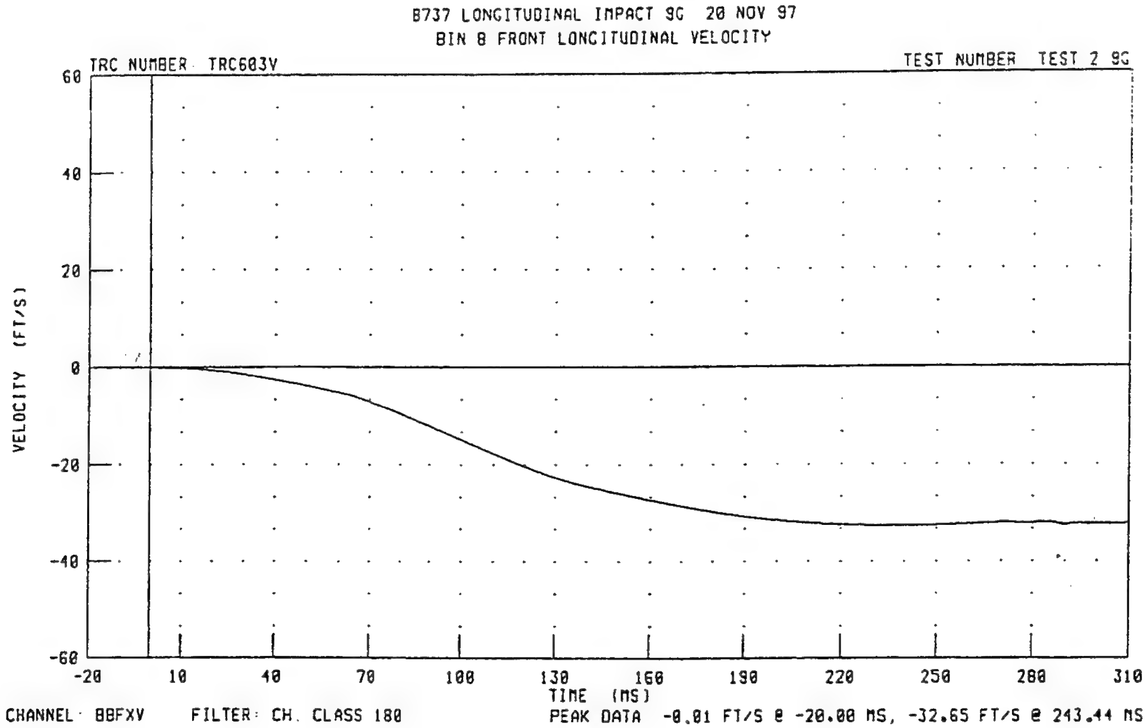
B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN 8 FRONT LONGITUDINAL ACCELERATION
TRC NUMBER: TRC683P
TEST NUMBER TEST 2 9G
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: B8FXG FILTER: CH. CLASS 60
PEAK DATA: 1.97 G @ 281.04 MS; -8.99 G @ 106.80 MS

B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN B FRONT LATERAL ACCELERATION

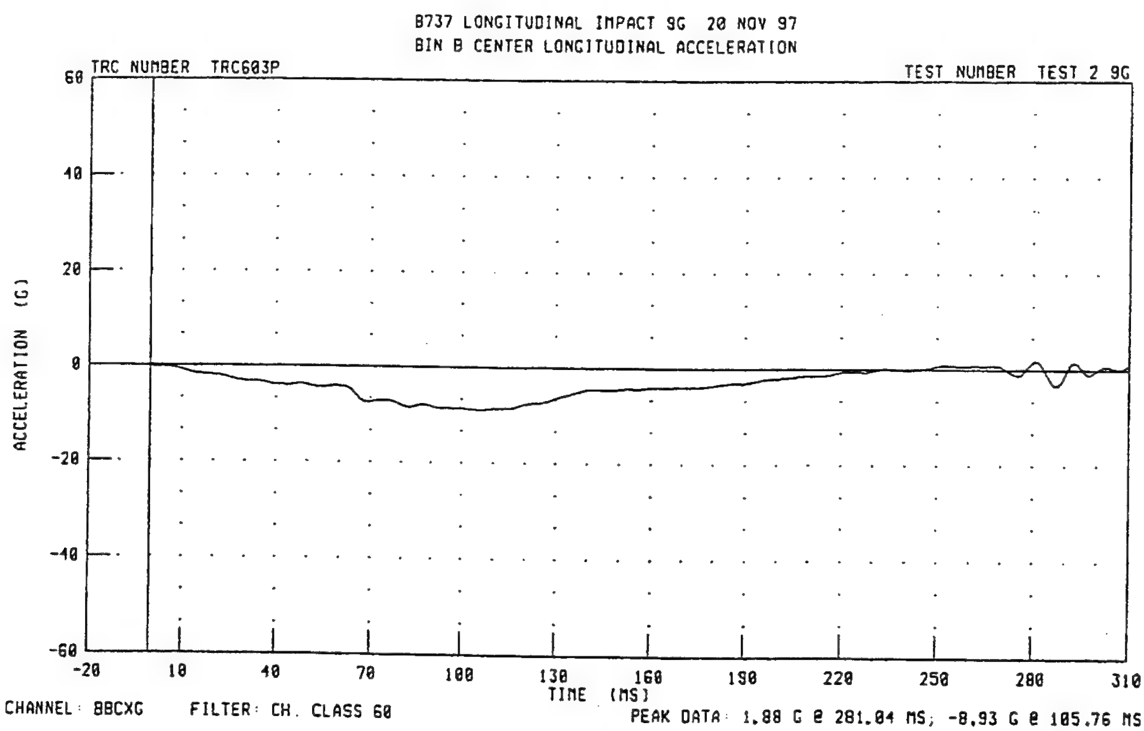


B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN B FRONT VERTICAL ACCELERATION

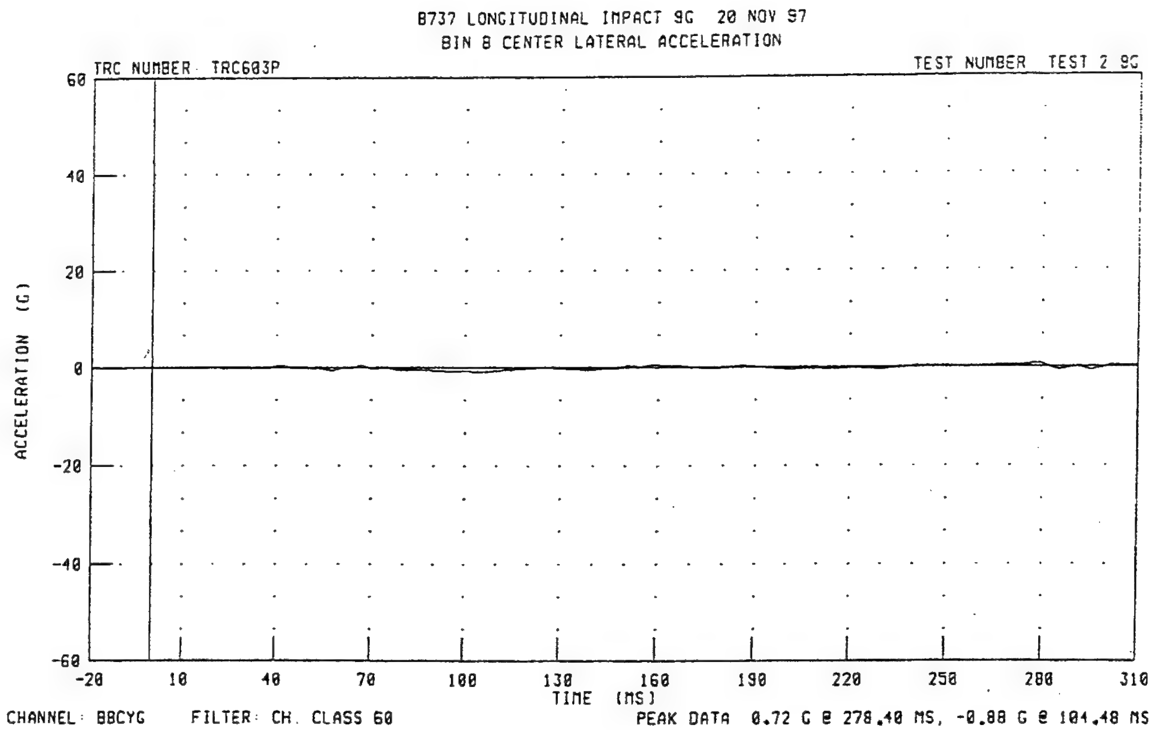




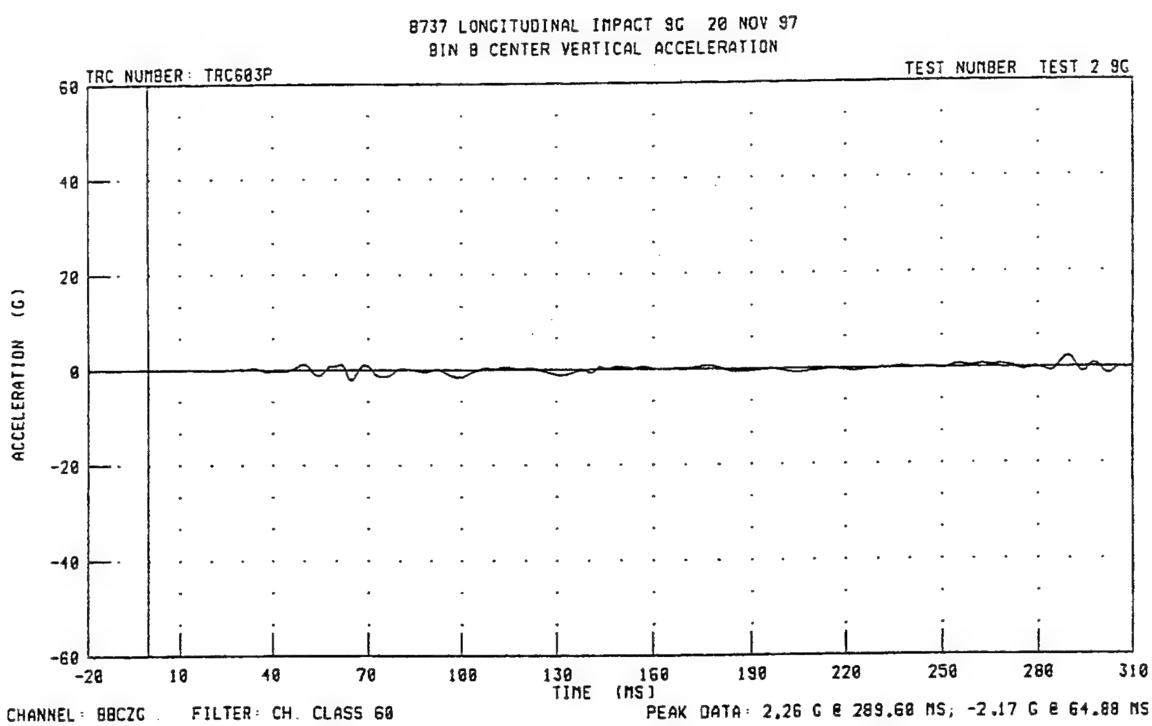
B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN B FRONT LONGITUDINAL VELOCITY
TRC NUMBER TRC603V
TEST NUMBER TEST 2 9G
VELOCITY (FT/S)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BBFXV
FILTER: CH. CLASS 180
PEAK DATA -0.01 FT/S @ -20.00 MS, -32.65 FT/S @ 243.44 MS



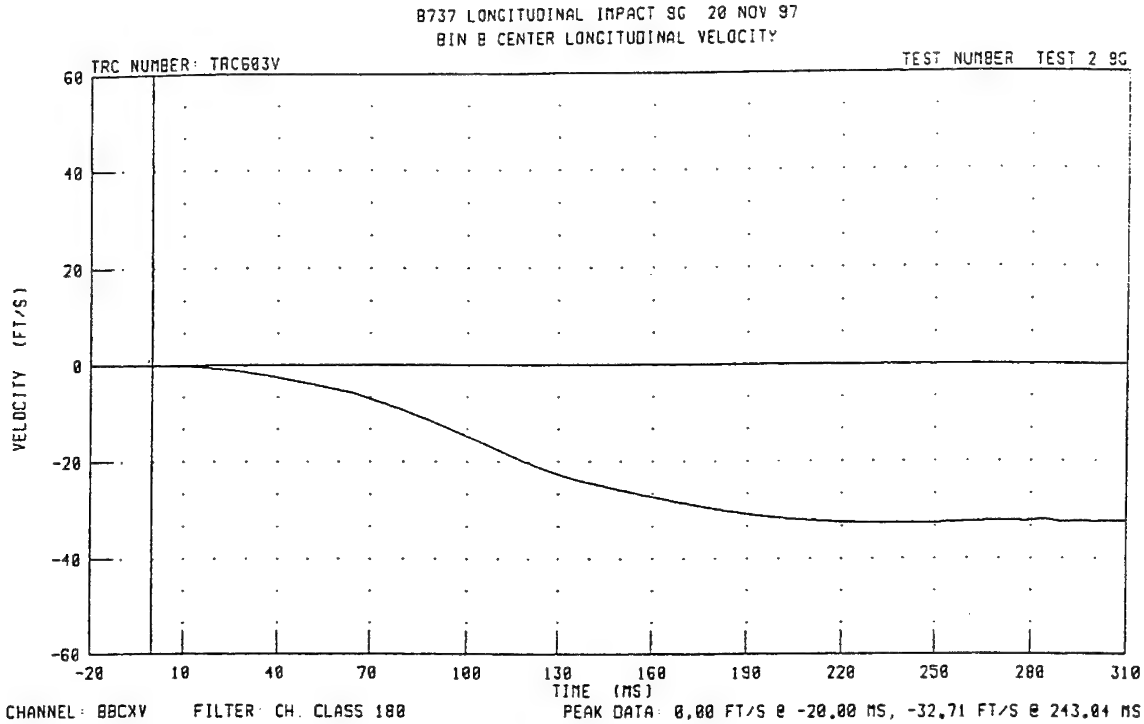
B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN B CENTER LONGITUDINAL ACCELERATION
TRC NUMBER TRC603P
TEST NUMBER TEST 2 9G
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BBCXG
FILTER: CH. CLASS 60
PEAK DATA: 1.88 G @ 281.04 MS; -8.93 G @ 105.76 MS

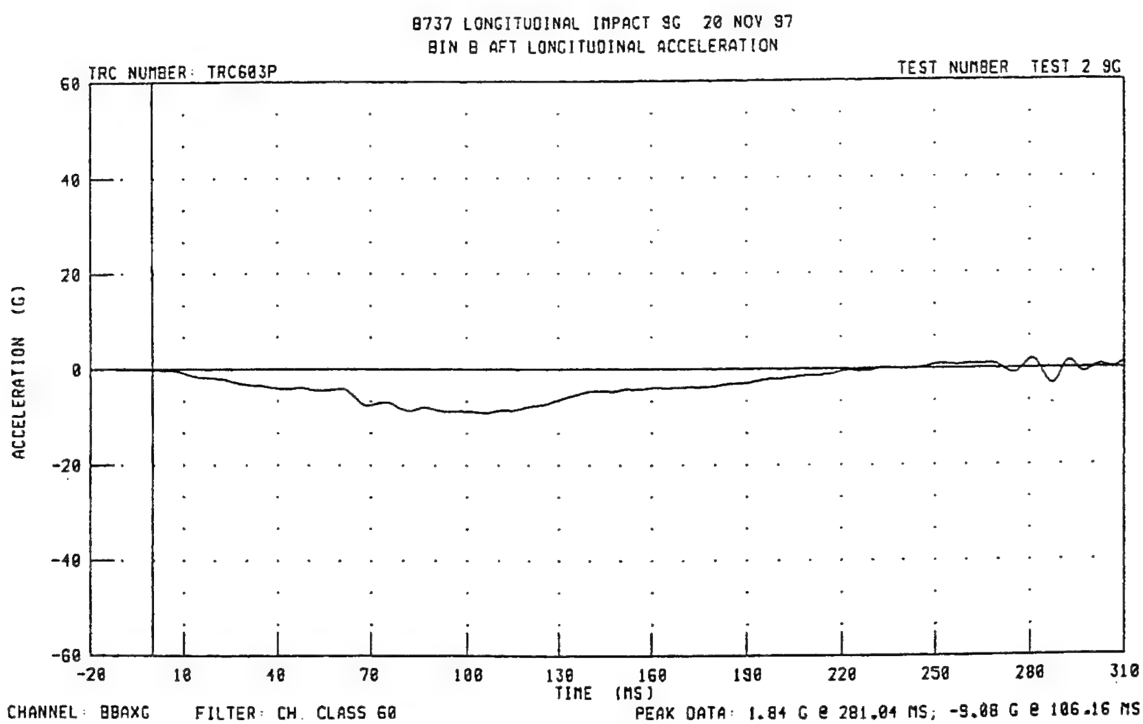


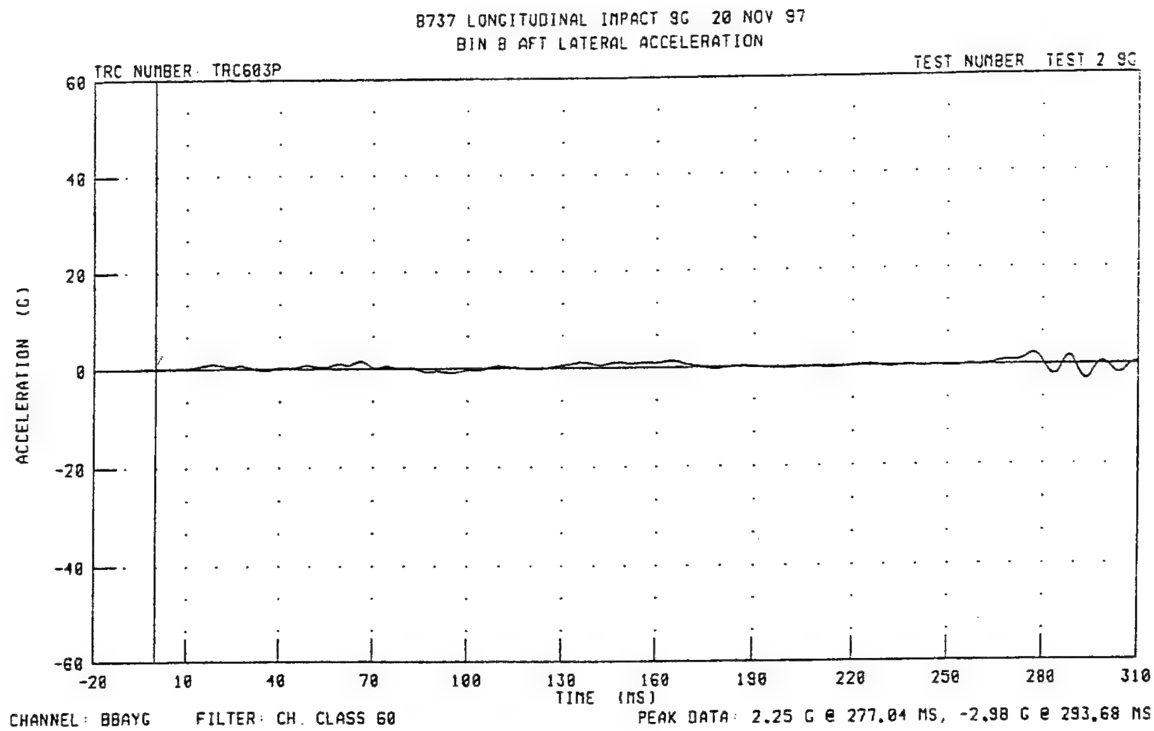
B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN 8 CENTER LATERAL ACCELERATION
TRC NUMBER: TRC603P
TEST NUMBER TEST 2 9G
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: B8CYG
FILTER: CH. CLASS 60
PEAK DATA 0.72 G @ 278.40 MS, -0.88 G @ 104.48 MS

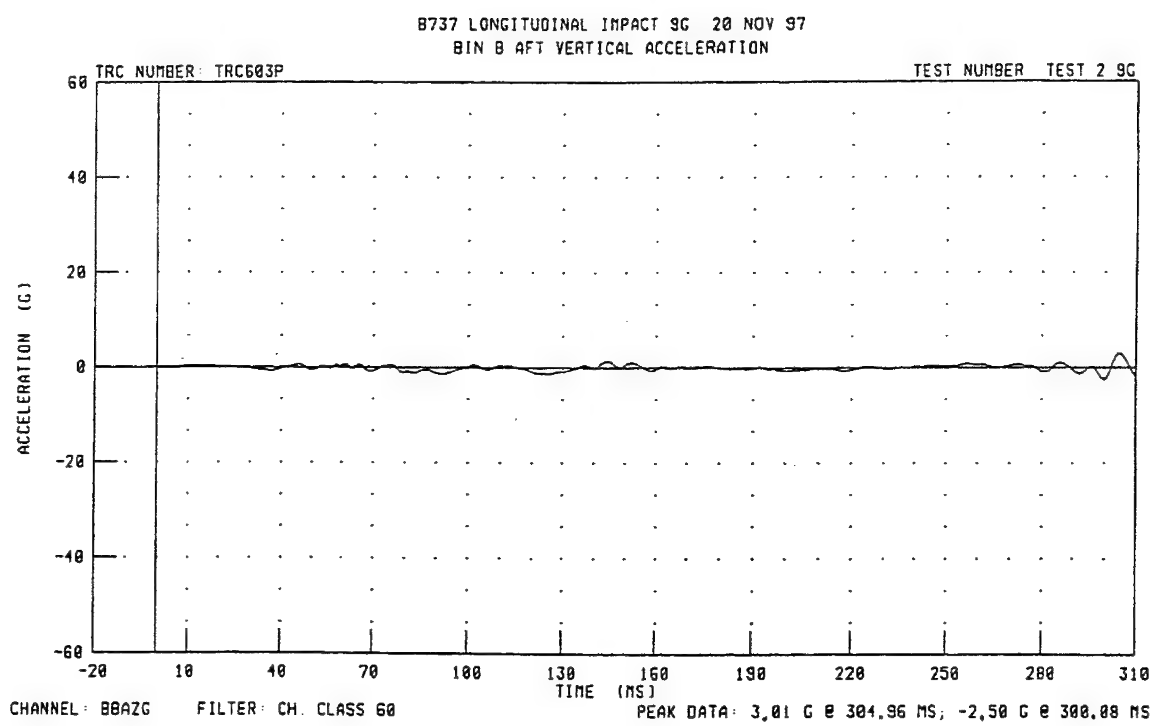


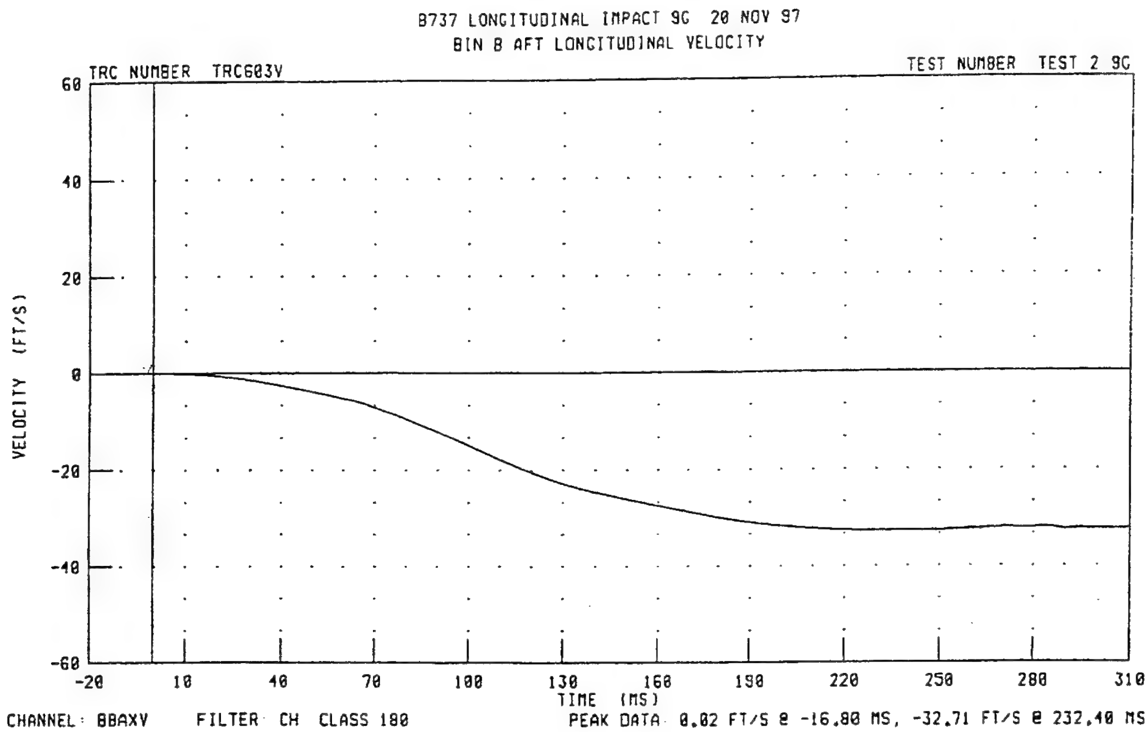
B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN 8 CENTER VERTICAL ACCELERATION
TRC NUMBER: TRC603P
TEST NUMBER TEST 2 9G
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: B8CZG
FILTER: CH. CLASS 60
PEAK DATA: 2.26 G @ 289.60 MS; -2.17 G @ 64.88 MS

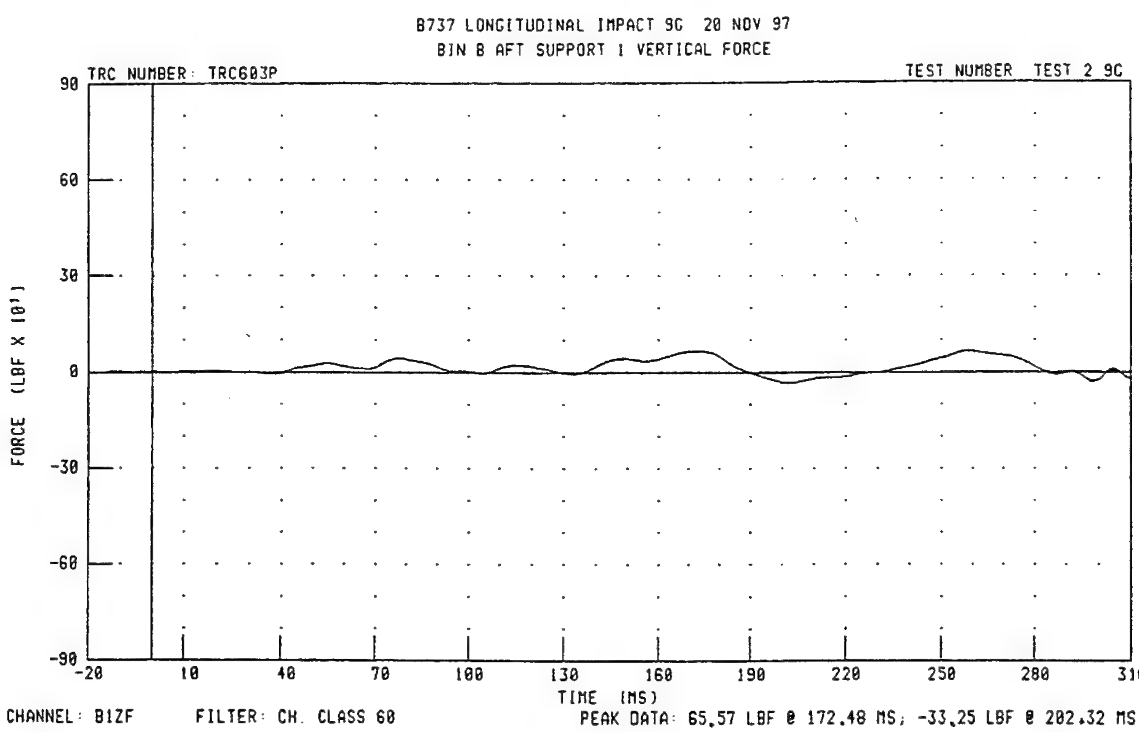

B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN B CENTER LONGITUDINAL VELOCITY
TRC NUMBER: TRC603V
TEST NUMBER TEST 2 9G
VELOCITY (FT/S)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BBCXV
FILTER: CH. CLASS 180
PEAK DATA: 0.00 FT/S @ -20.00 MS, -32.71 FT/S @ 243.04 MS

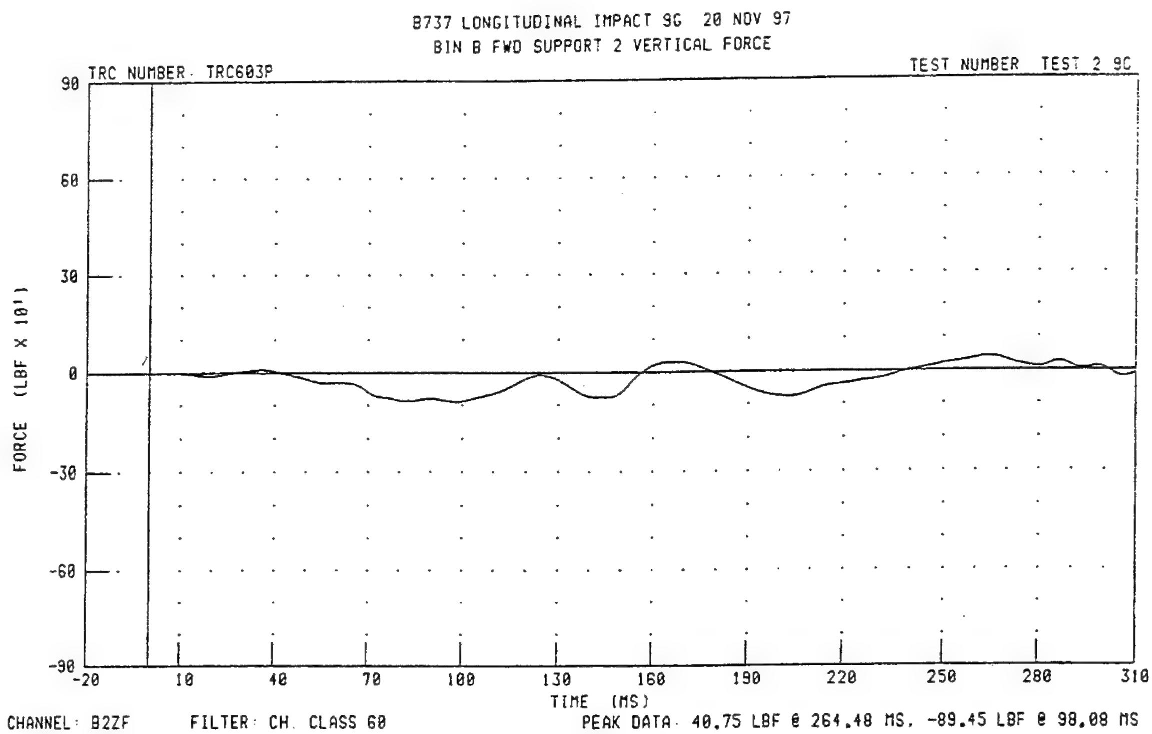

B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN B AFT LONGITUDINAL ACCELERATION
TRC NUMBER: TRC603P
TEST NUMBER TEST 2 9G
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BBAXG
FILTER: CH. CLASS 60
PEAK DATA: 1.84 G @ 281.04 MS; -9.08 G @ 106.16 MS

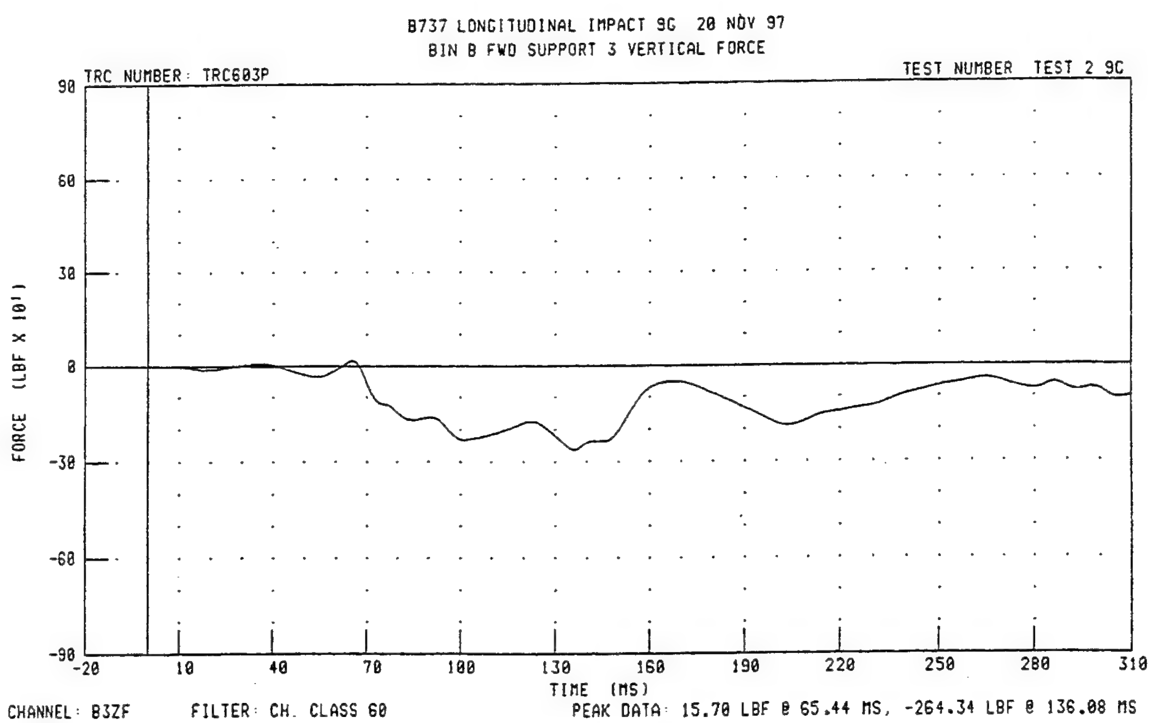

B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN B AFT LATERAL ACCELERATION
TRC NUMBER: TRC603P
TEST NUMBER TEST 2 9G
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BBAYG
FILTER: CH. CLASS 60
PEAK DATA: 2.25 G @ 277.04 MS, -2.98 G @ 293.68 MS

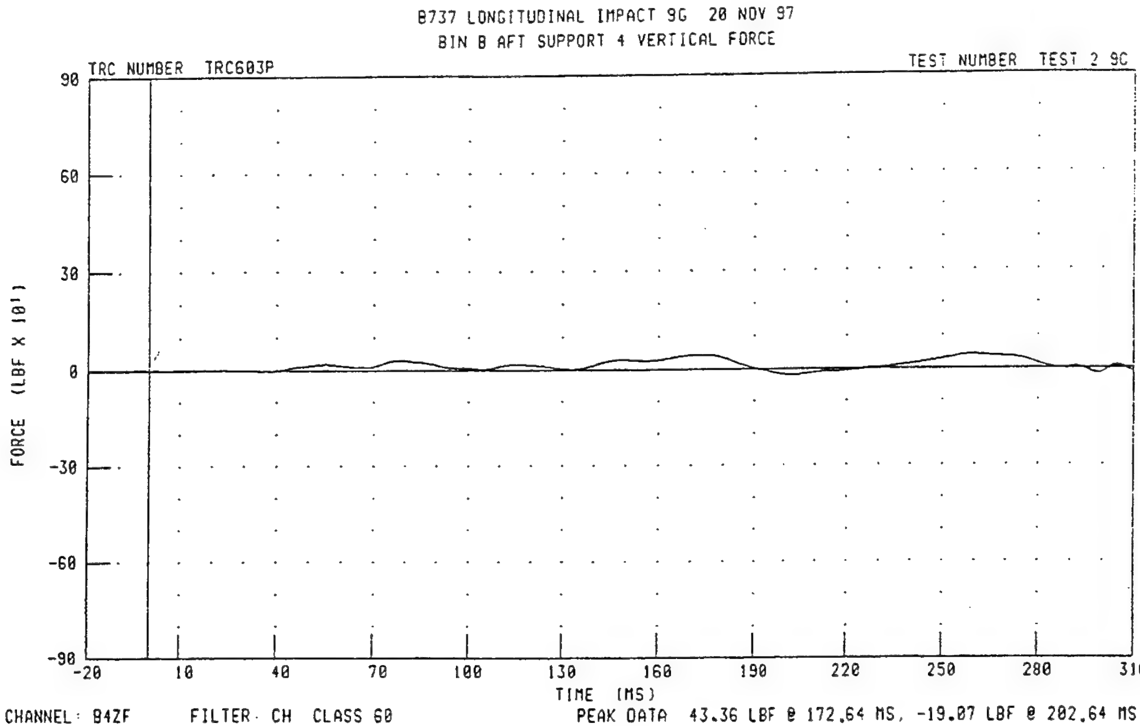

B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN B AFT VERTICAL ACCELERATION
TRC NUMBER: TRC603P
TEST NUMBER TEST 2 9G
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BBAZG
FILTER: CH. CLASS 60
PEAK DATA: 3.01 G @ 304.96 MS; -2.50 G @ 300.08 MS

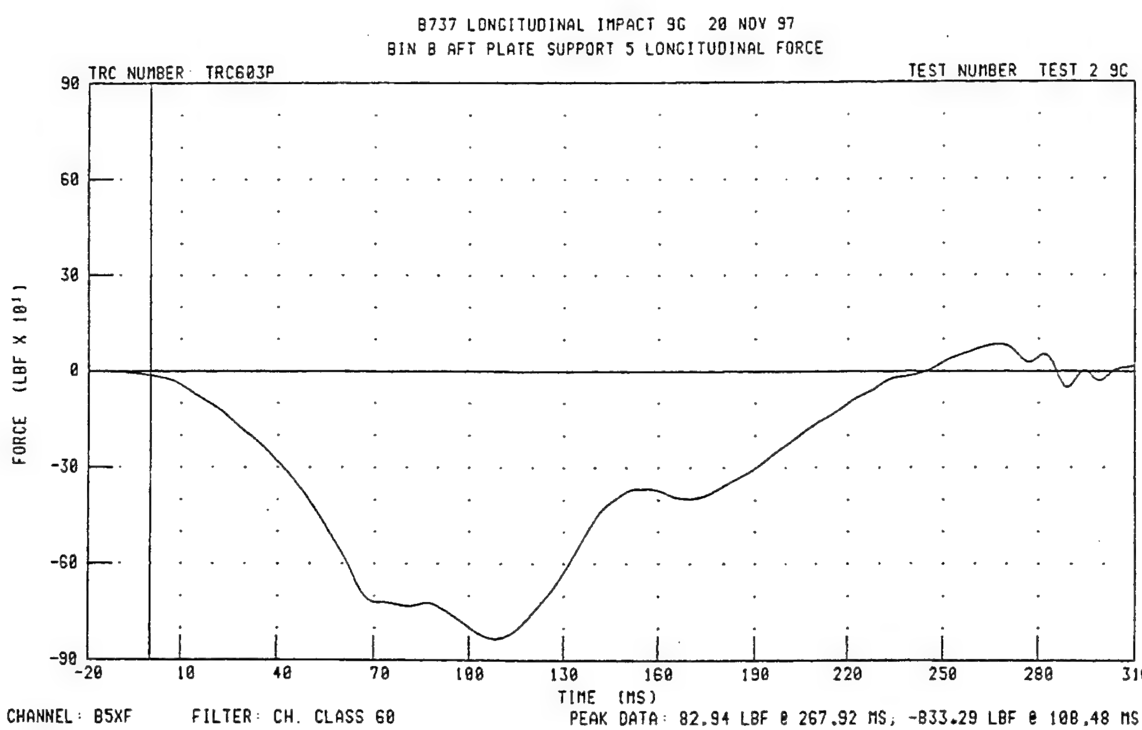

B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN 8 AFT LONGITUDINAL VELOCITY
TRC NUMBER TRC603V
TEST NUMBER TEST 2 9G
VELOCITY (FT/S)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: 8BAXV
FILTER: CH CLASS 180
PEAK DATA: 0.02 FT/S @ -16.80 MS, -32.71 FT/S @ 232.40 MS

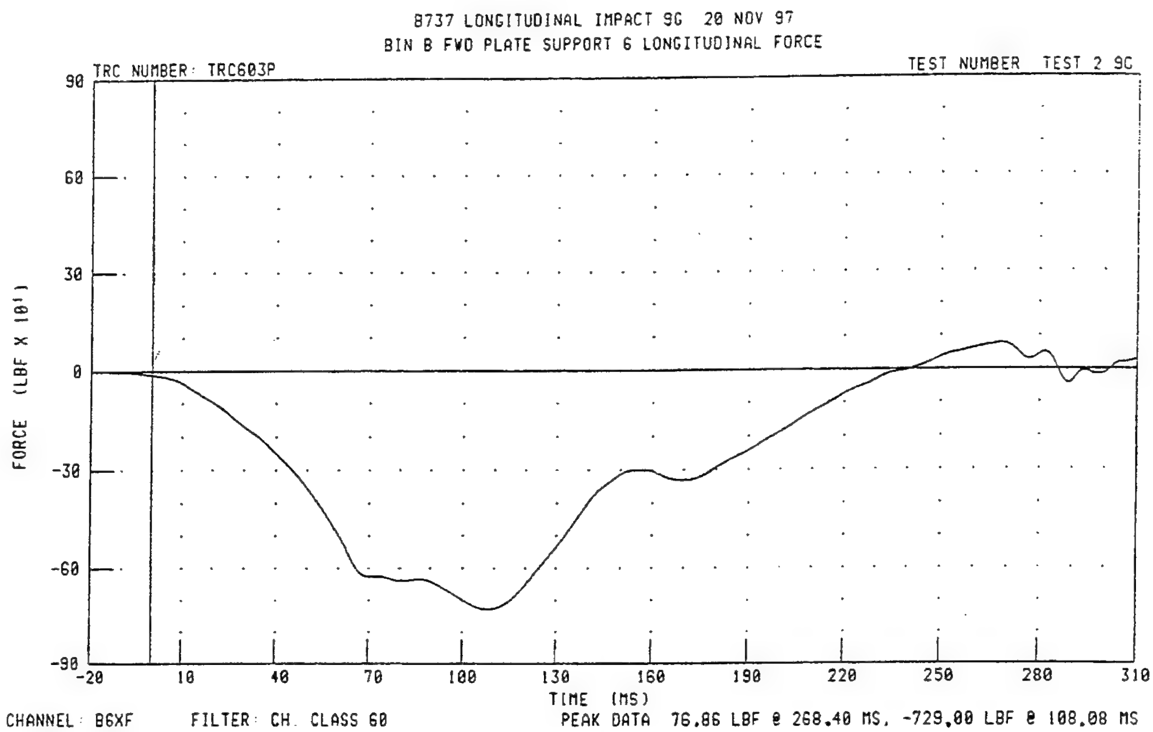

B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN 8 AFT SUPPORT 1 VERTICAL FORCE
TRC NUMBER: TRC603P
TEST NUMBER TEST 2 9G
FORCE (LBF X 10¹)
90
60
30
0
-30
-60
-90
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: B1ZF
FILTER: CH. CLASS 60
PEAK DATA: 65.57 LBF @ 172.48 MS; -33.25 LBF @ 202.32 MS


B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN B FWD SUPPORT 2 VERTICAL FORCE
TRC NUMBER: TRC603P
TEST NUMBER TEST 2 9C
FORCE (LBF X 10¹)
90
60
30
0
-30
-60
-90
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: B2ZF
FILTER: CH. CLASS 60
PEAK DATA: 40.75 LBF @ 264.48 MS, -89.45 LBF @ 98.08 MS

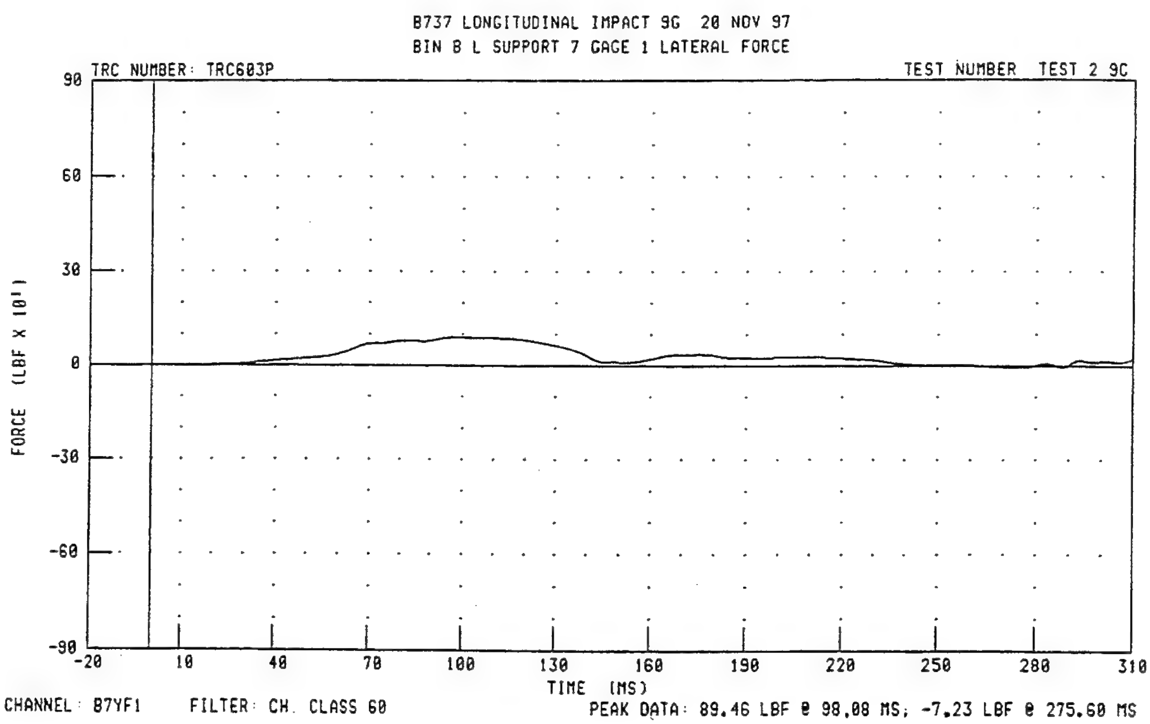

B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN B FWD SUPPORT 3 VERTICAL FORCE
TRC NUMBER: TRC603P
TEST NUMBER TEST 2 9C
FORCE (LBF X 10¹)
90
60
30
0
-30
-60
-90
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: B3ZF
FILTER: CH. CLASS 60
PEAK DATA: 15.70 LBF @ 65.44 MS, -264.34 LBF @ 136.08 MS


B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN B AFT SUPPORT 4 VERTICAL FORCE
TRC NUMBER TRC603P
TEST NUMBER TEST 2 9C
FORCE (LBF X 10¹)
90
60
30
0
-30
-60
-90
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: B4ZF
FILTER: CH CLASS 60
PEAK DATA 43.36 LBF @ 172.64 MS, -19.07 LBF @ 202.64 MS

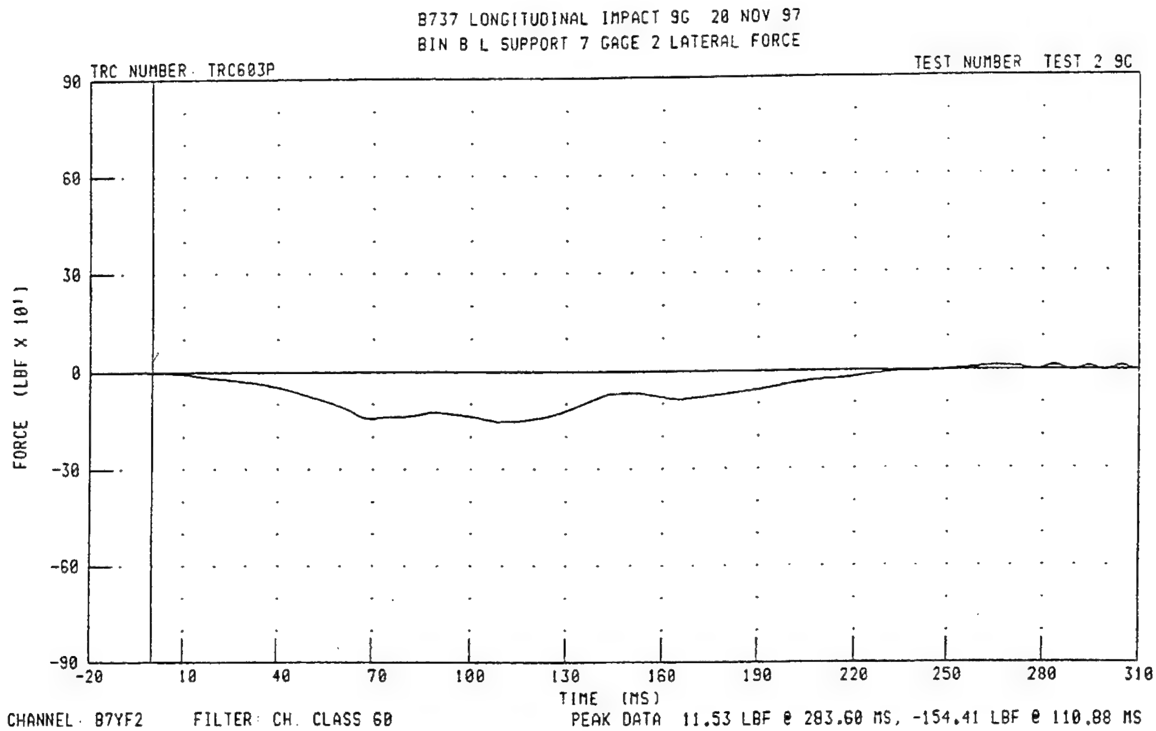

B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN B AFT PLATE SUPPORT 5 LONGITUDINAL FORCE
TRC NUMBER: TRC603P
TEST NUMBER TEST 2 9C
FORCE (LBF X 10¹)
90
60
30
0
-30
-60
-90
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: B5XF
FILTER: CH. CLASS 60
PEAK DATA: 82.94 LBF @ 267.92 MS, -833.29 LBF @ 108.48 MS

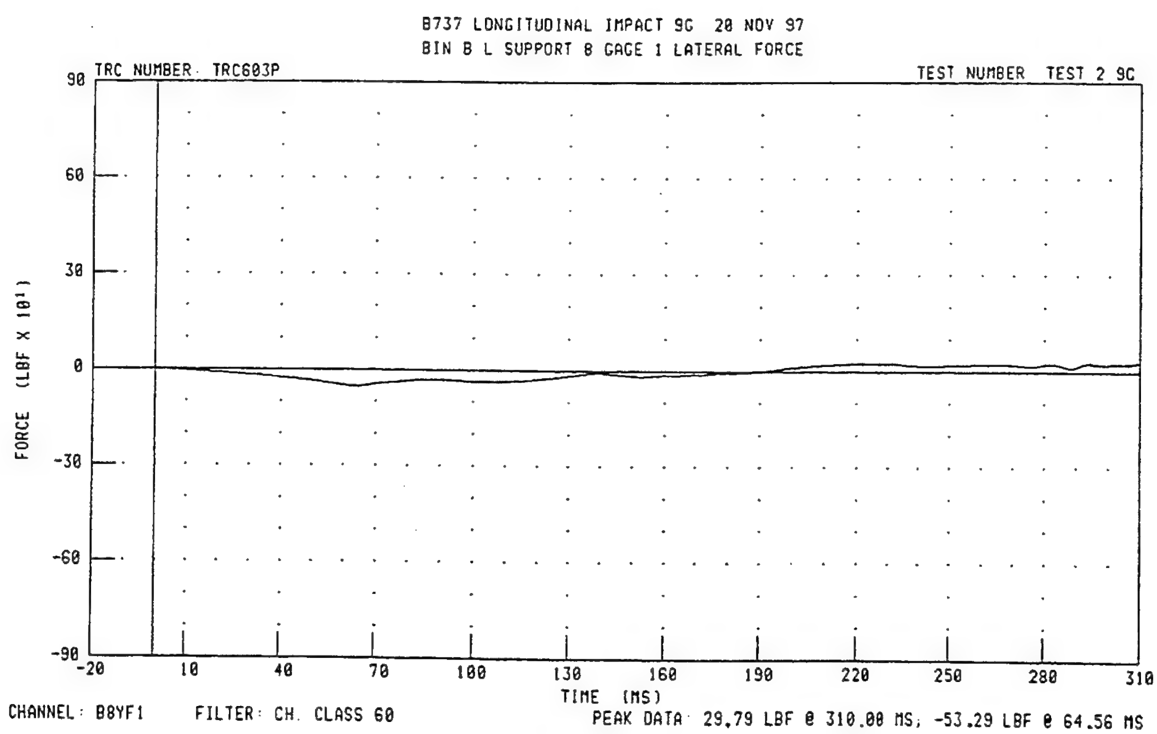


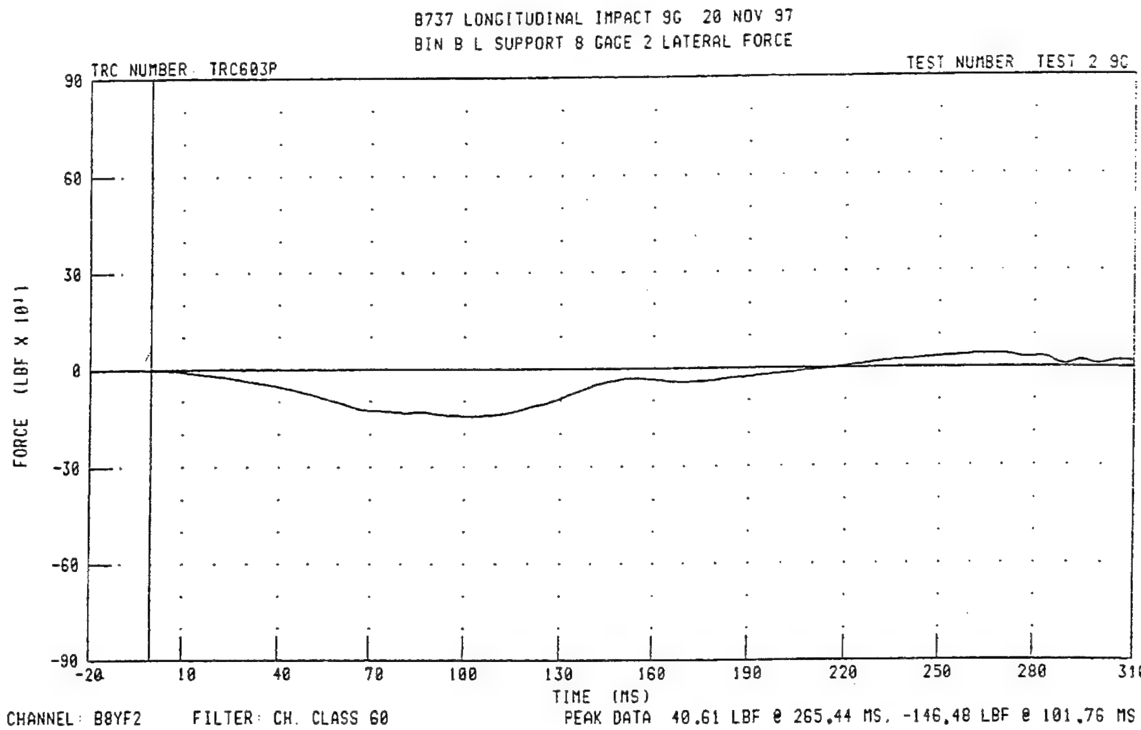
B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN B FWD PLATE SUPPORT 6 LONGITUDINAL FORCE
TRC NUMBER: TRC603P
TEST NUMBER TEST 2 9C
FORCE (LBF X 10¹)
90
60
30
0
-30
-60
-90
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: B6XF
FILTER: CH. CLASS 60
PEAK DATA 76.86 LBF @ 268.40 MS, -729.00 LBF @ 108.08 MS

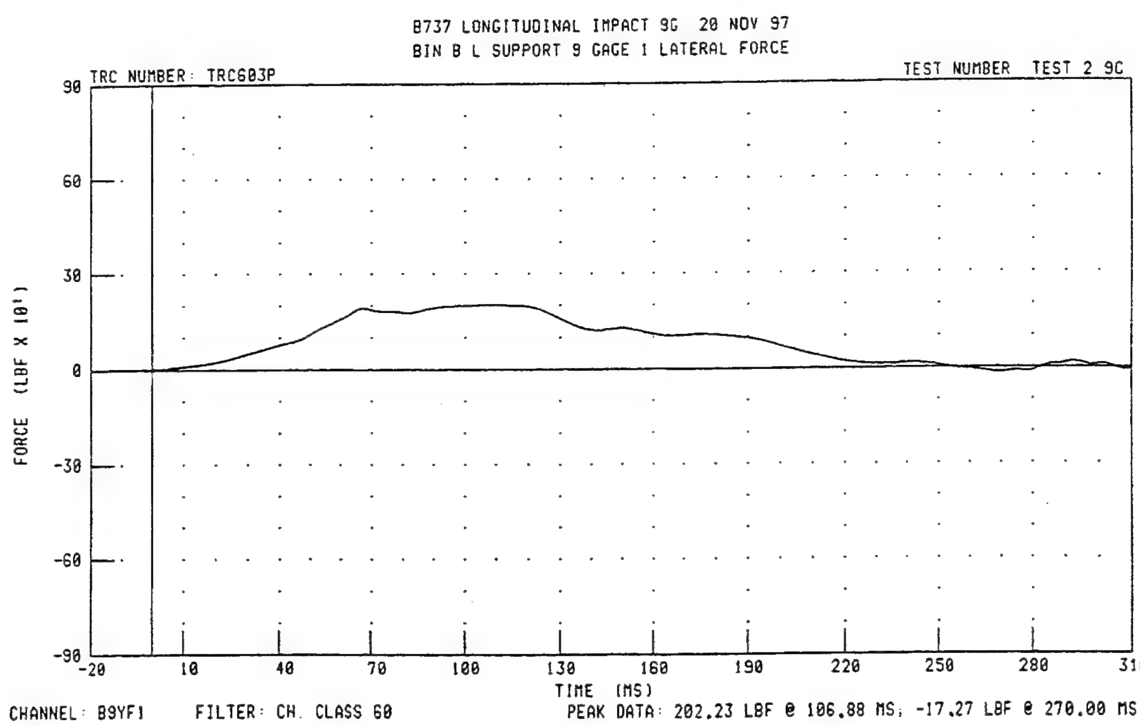


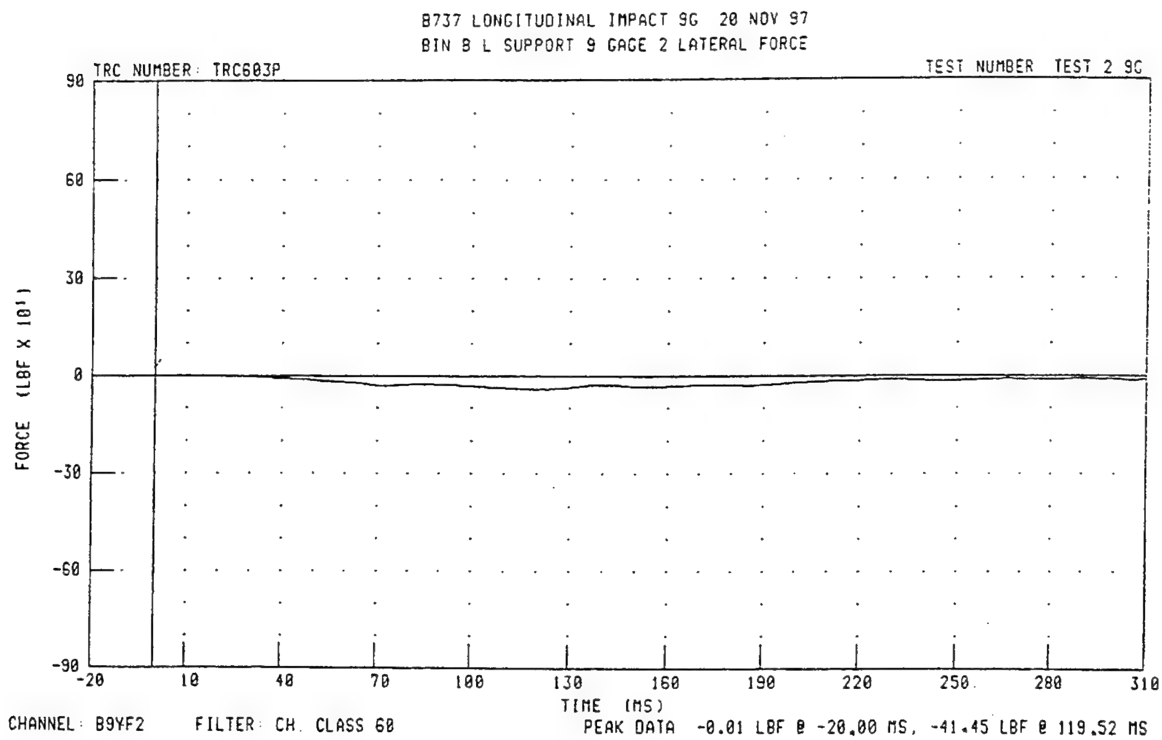
B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN B L SUPPORT 7 GAGE 1 LATERAL FORCE
TRC NUMBER: TRC603P
TEST NUMBER TEST 2 9C
FORCE (LBF X 10¹)
90
60
30
0
-30
-60
-90
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: B7YF1
FILTER: CH. CLASS 60
PEAK DATA: 89.46 LBF @ 98.08 MS; -7.23 LBF @ 275.60 MS

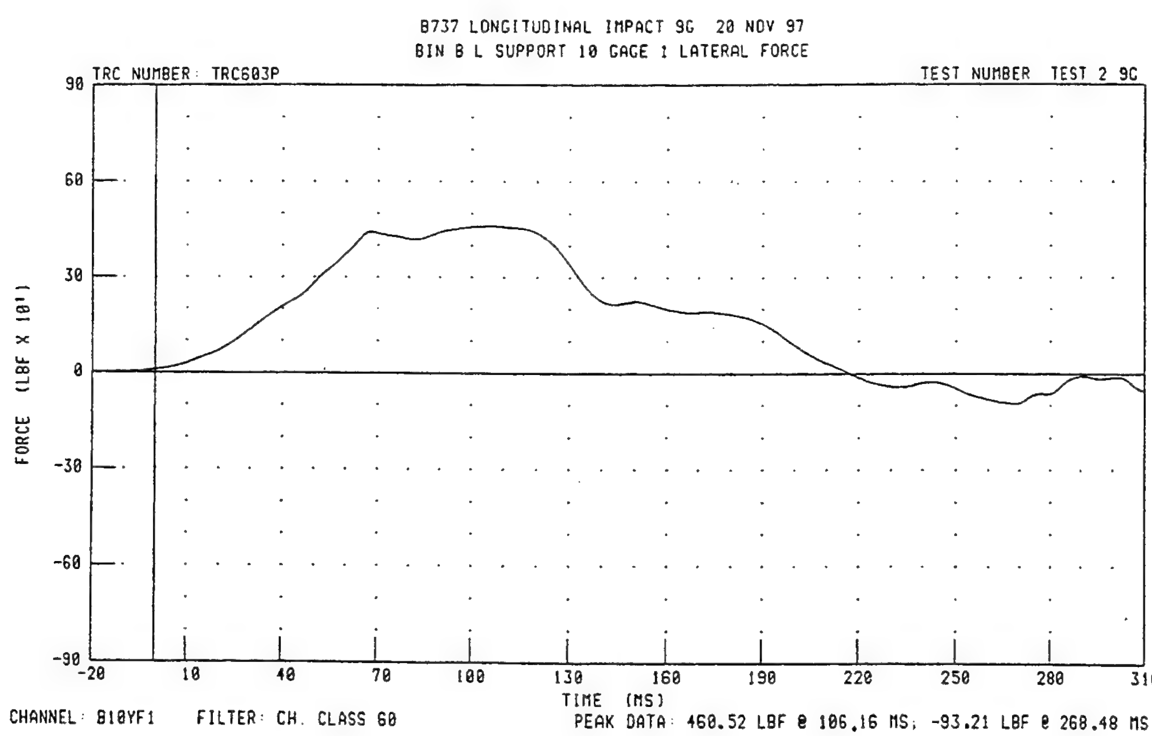

B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN B L SUPPORT 7 GAGE 2 LATERAL FORCE
TRC NUMBER: TRC603P
TEST NUMBER TEST 2 9C
FORCE (LBF X 10¹)
90
60
30
0
-30
-60
-90
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: B7YF2
FILTER: CH. CLASS 60
PEAK DATA 11.53 LBF @ 283.60 MS, -154.41 LBF @ 110.88 MS

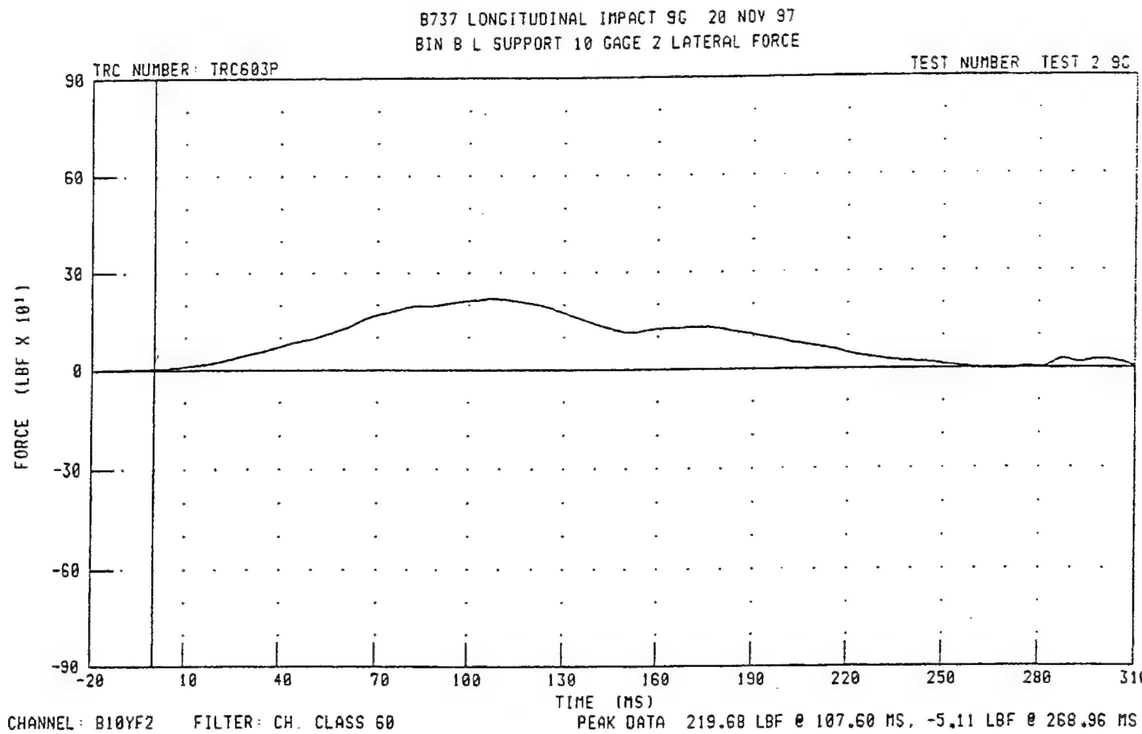

B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN B L SUPPORT 8 GAGE 1 LATERAL FORCE
TRC NUMBER: TRC603P
TEST NUMBER TEST 2 9C
FORCE (LBF X 10¹)
90
60
30
0
-30
-60
-90
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: B8YF1
FILTER: CH. CLASS 60
PEAK DATA: 29.79 LBF @ 310.00 MS, -53.29 LBF @ 64.56 MS


B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN B L SUPPORT 8 GAGE 2 LATERAL FORCE
TRC NUMBER: TRC603P
TEST NUMBER TEST 2 9G
FORCE (LBF X 10¹)
90
60
30
0
-30
-60
-90
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: B8YF2
FILTER: CH. CLASS 60
PEAK DATA 40.61 LBF @ 265.44 MS, -146.48 LBF @ 101.76 MS

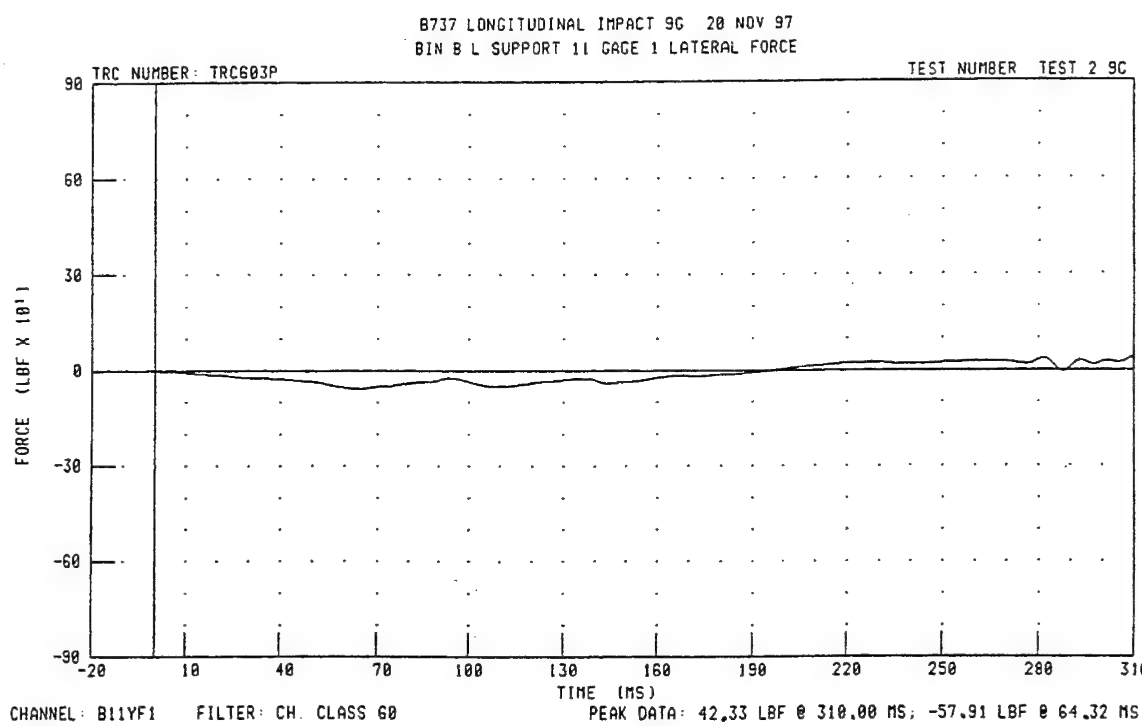

B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN B L SUPPORT 9 GAGE 1 LATERAL FORCE
TRC NUMBER: TRC603P
TEST NUMBER TEST 2 9G
FORCE (LBF X 10¹)
90
60
30
0
-30
-60
-90
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: B9YF1
FILTER: CH. CLASS 60
PEAK DATA: 202.23 LBF @ 106.88 MS; -17.27 LBF @ 270.00 MS


B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN B L SUPPORT 9 GAGE 2 LATERAL FORCE
TRC NUMBER: TRC603P
TEST NUMBER TEST 2 9G
FORCE (LBF X 10¹)
90
60
30
0
-30
-60
-90
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: B9YF2
FILTER: CH. CLASS 60
PEAK DATA -0.01 LBF @ -20.00 MS, -41.45 LBF @ 119.52 MS

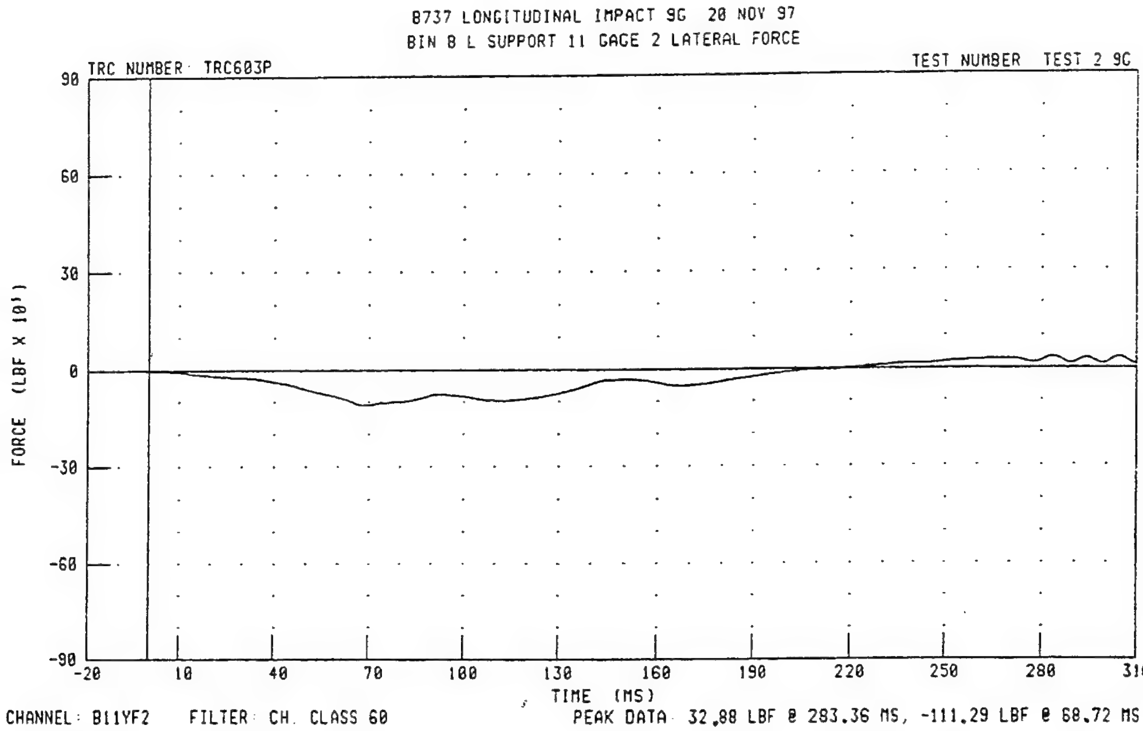

B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN B L SUPPORT 10 GAGE 1 LATERAL FORCE
TRC NUMBER: TRC603P
TEST NUMBER TEST 2 9G
FORCE (LBF X 10¹)
90
60
30
0
-30
-60
-90
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: B10YF1
FILTER: CH. CLASS 60
PEAK DATA: 460.52 LBF @ 106.16 MS; -93.21 LBF @ 268.48 MS



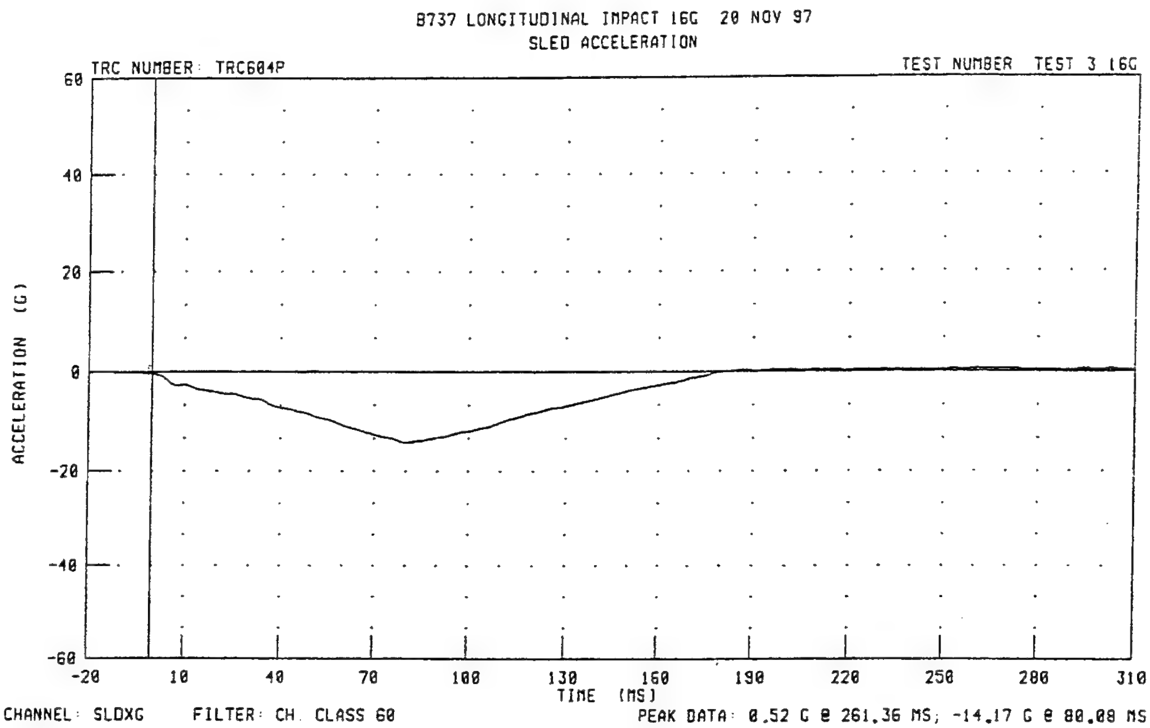
B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN B L SUPPORT 10 GAGE 2 LATERAL FORCE
TRC NUMBER: TRC603P
TEST NUMBER TEST 2 9G
FORCE (LBF X 10¹)
90
60
30
0
-30
-60
-90
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: B10YF2 FILTER: CH. CLASS 60
PEAK DATA 219.68 LBF @ 107.60 MS, -5.11 LBF @ 268.96 MS



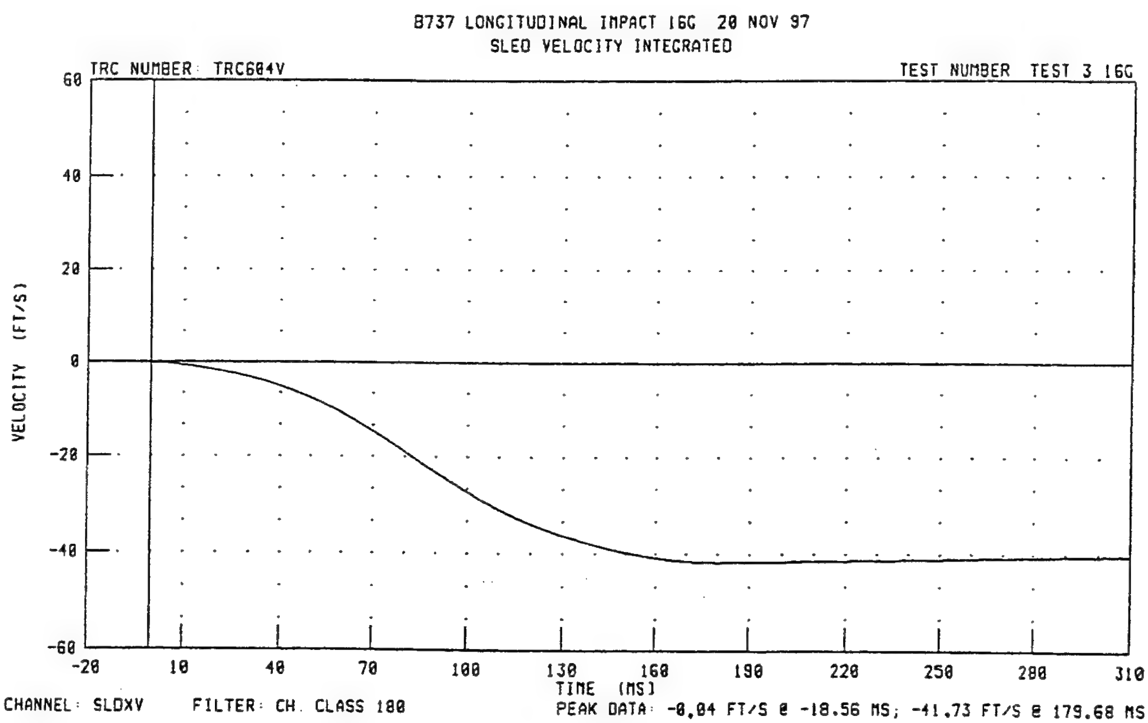
B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN B L SUPPORT 11 GAGE 1 LATERAL FORCE
TRC NUMBER: TRC603P
TEST NUMBER TEST 2 9G
FORCE (LBF X 10¹)
90
60
30
0
-30
-60
-90
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: B11YF1 FILTER: CH. CLASS 60
PEAK DATA: 42.33 LBF @ 310.00 MS; -57.91 LBF @ 64.32 MS


B737 LONGITUDINAL IMPACT 9G 20 NOV 97
BIN 8 L SUPPORT 11 GAGE 2 LATERAL FORCE
TRC NUMBER: TRC603P
TEST NUMBER TEST 2 9C
FORCE (LBF X 10¹)
90
60
30
0
-30
-60
-90
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: B11YF2
FILTER: CH. CLASS 60
PEAK DATA 32.88 LBF @ 283.36 MS, -111.29 LBF @ 68.72 MS

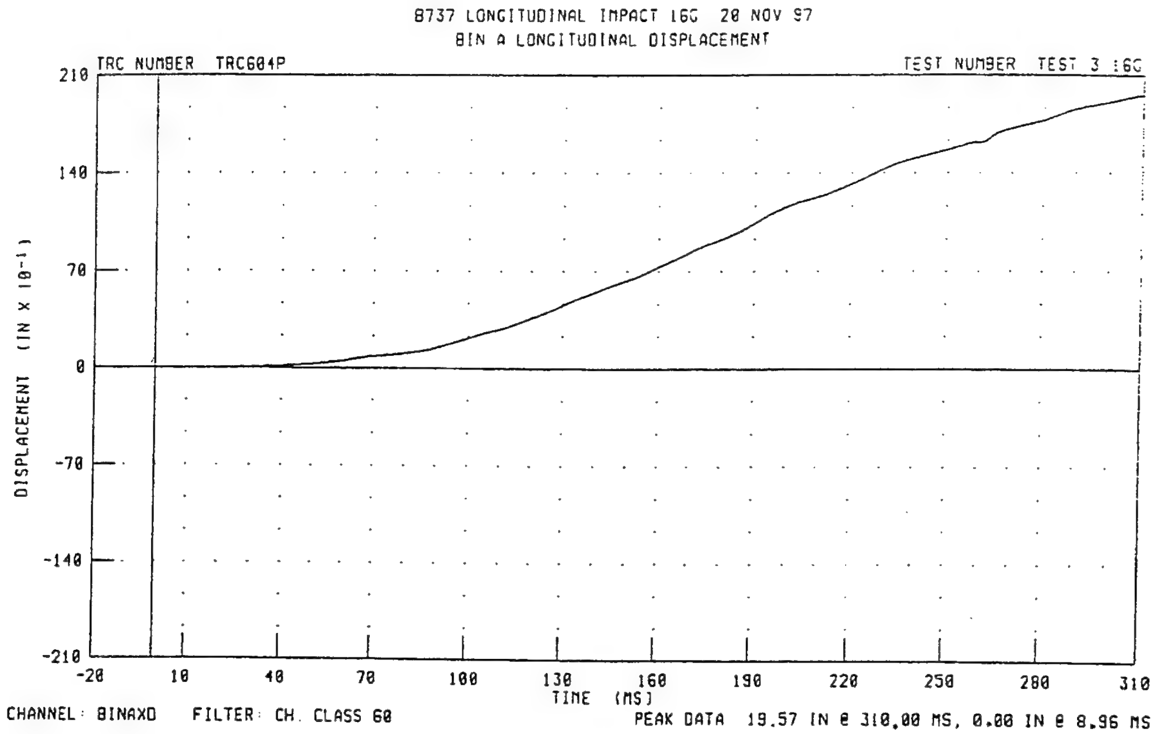
TEST 3



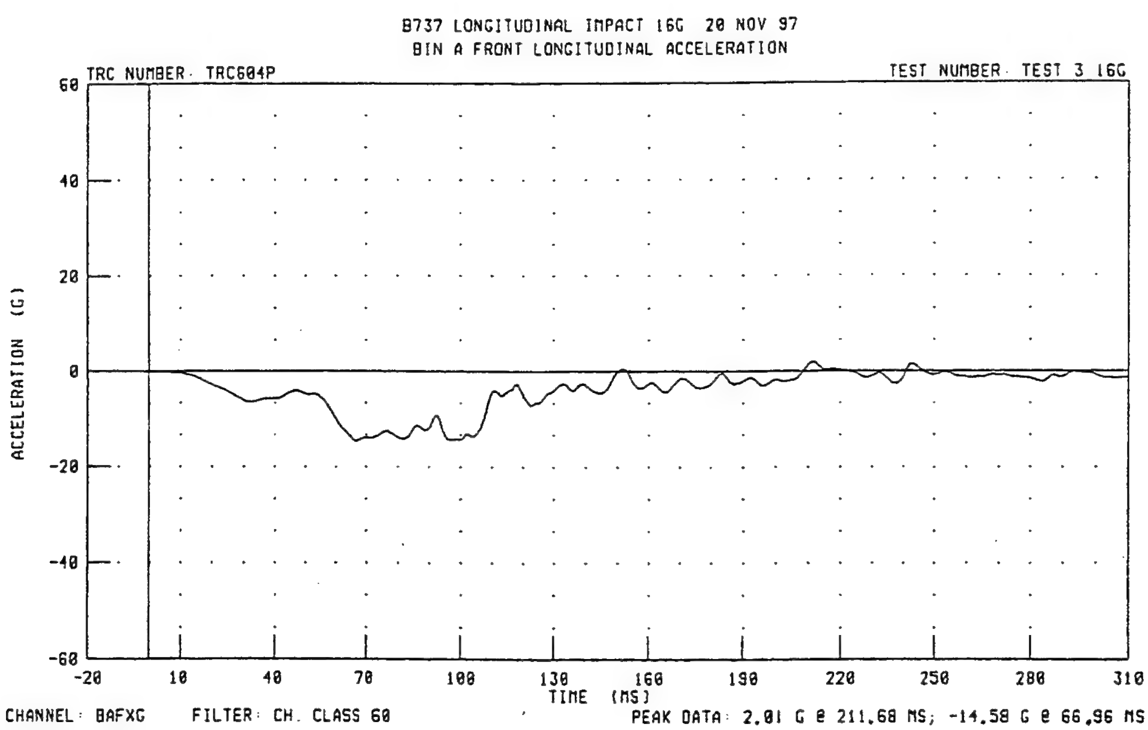
B737 LONGITUDINAL IMPACT 16G 20 NOV 97
SLED ACCELERATION
TRC NUMBER: TRC604P
TEST NUMBER TEST 3 16G
60
40
20
0
-20
-40
-60
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: SLDXG
FILTER: CH. CLASS 60
PEAK DATA: 0.52 G @ 261.36 MS; -14.17 G @ 80.08 MS



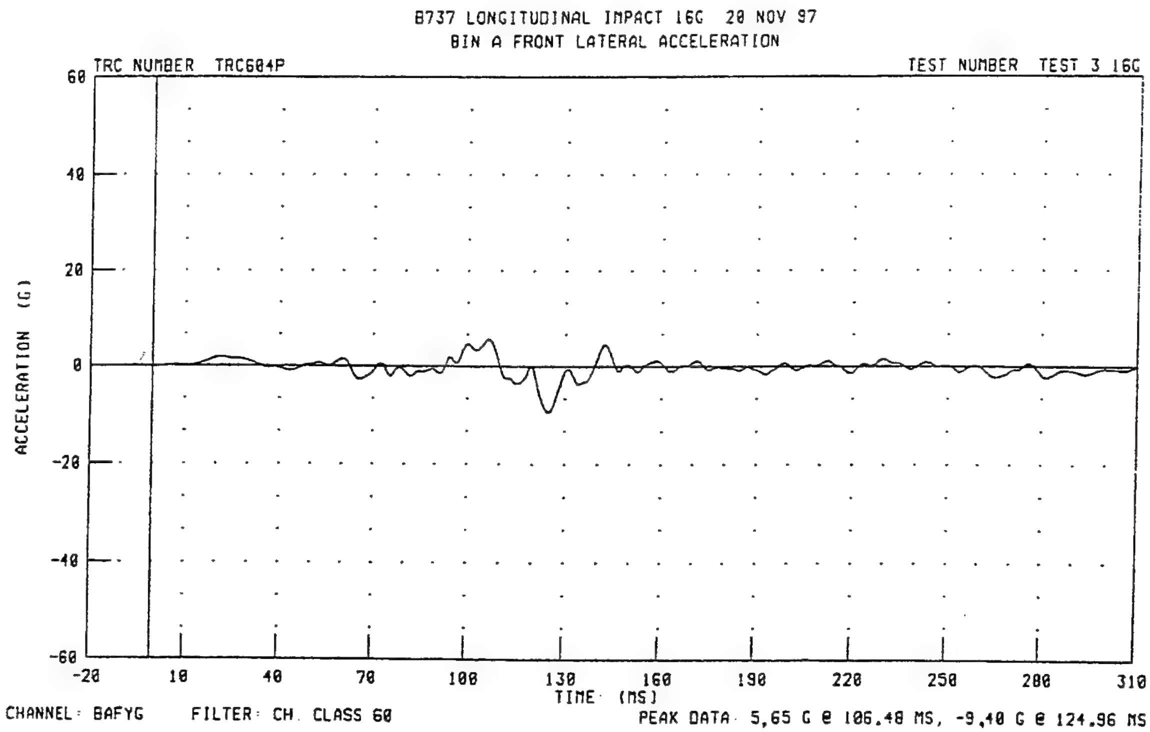
B737 LONGITUDINAL IMPACT 16G 20 NOV 97
SLED VELOCITY INTEGRATED
TRC NUMBER: TRC604V
TEST NUMBER TEST 3 16G
60
40
20
0
-20
-40
-60
VELOCITY (FT/S)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: SLDXV
FILTER: CH. CLASS 180
PEAK DATA: -0.04 FT/S @ -18.56 MS; -41.73 FT/S @ 179.68 MS



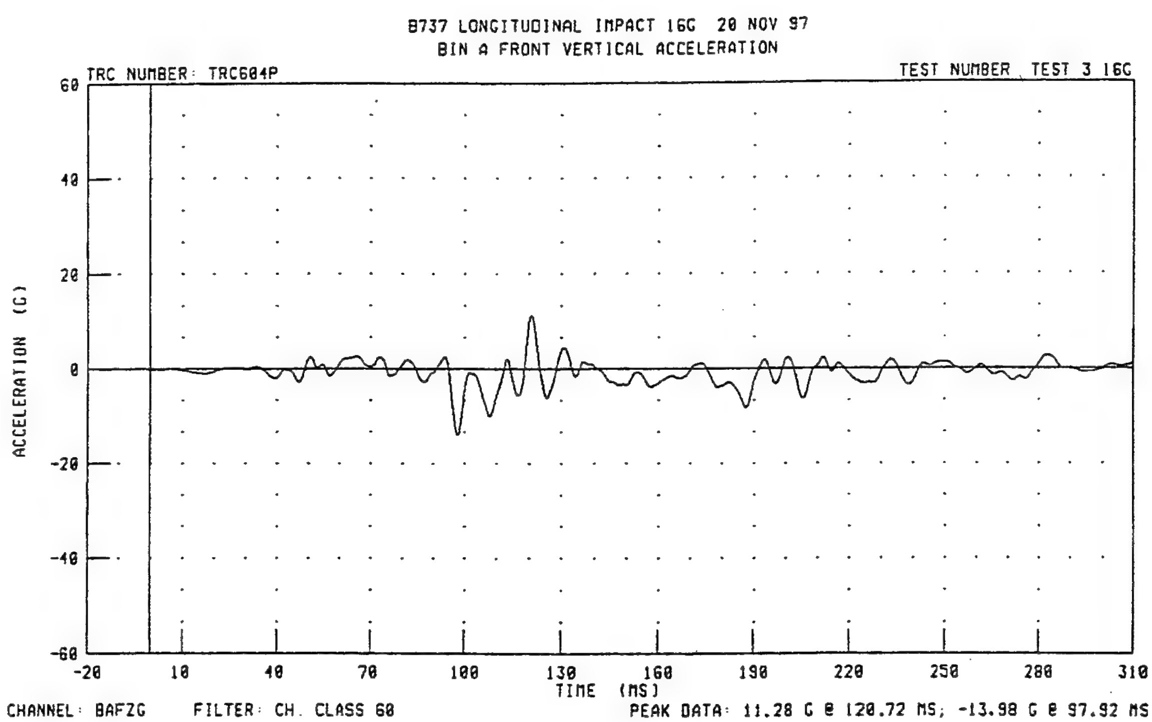
B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN A LONGITUDINAL DISPLACEMENT
TRC NUMBER TRC604P
TEST NUMBER TEST 3 16G
DISPLACEMENT (IN x 10-1)
210
140
70
0
-70
-140
-210
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BINAXD
FILTER: CH. CLASS 60
PEAK DATA 19.57 IN @ 310.00 MS, 0.00 IN @ 8.96 MS



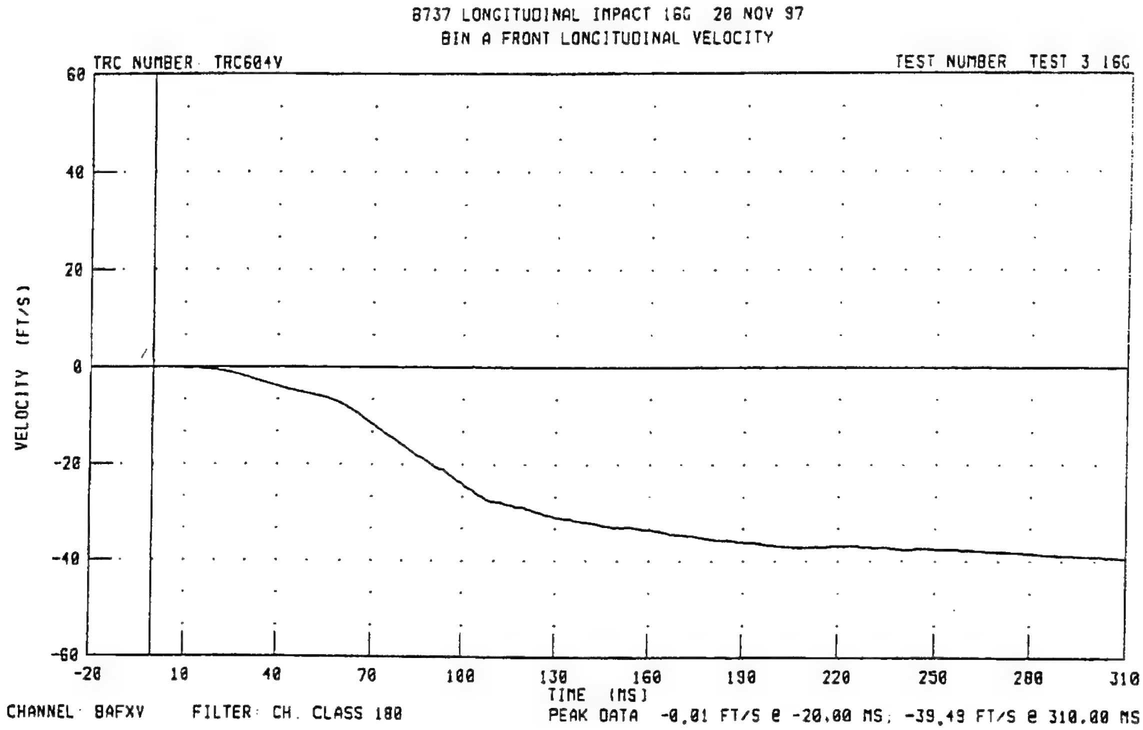
B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN A FRONT LONGITUDINAL ACCELERATION
TRC NUMBER: TRC604P
TEST NUMBER: TEST 3 16G
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BAFXG
FILTER: CH. CLASS 60
PEAK DATA: 2.01 G @ 211.68 MS; -14.58 G @ 66.96 MS

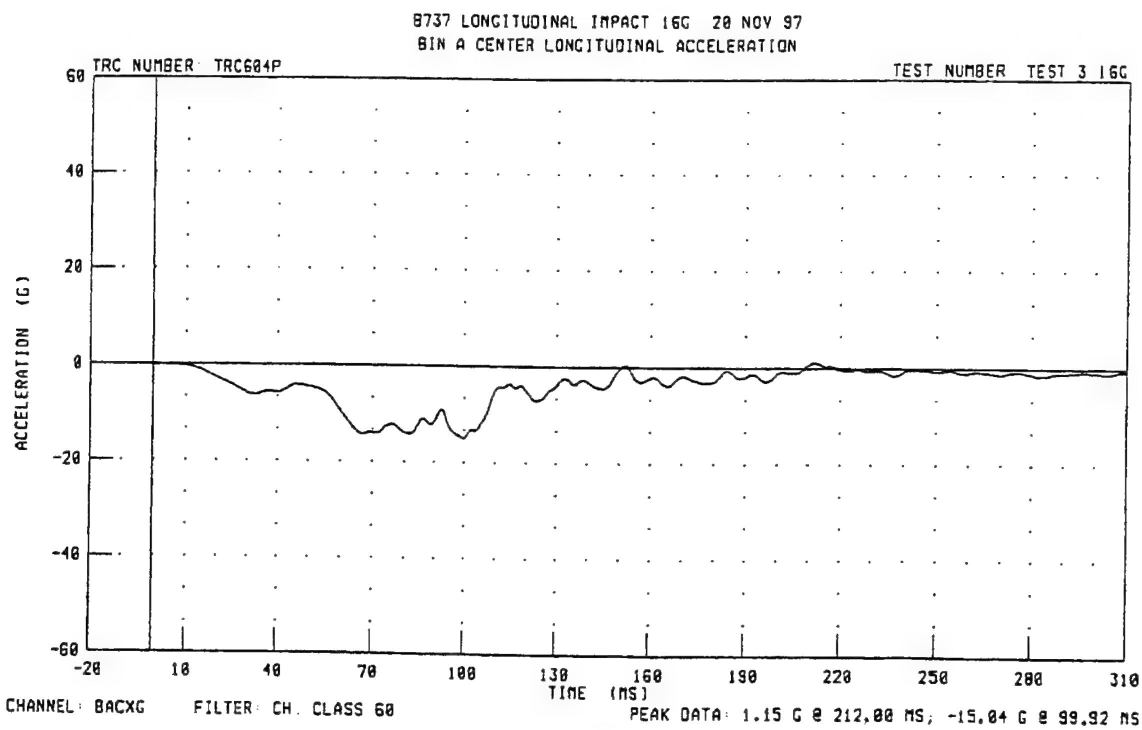


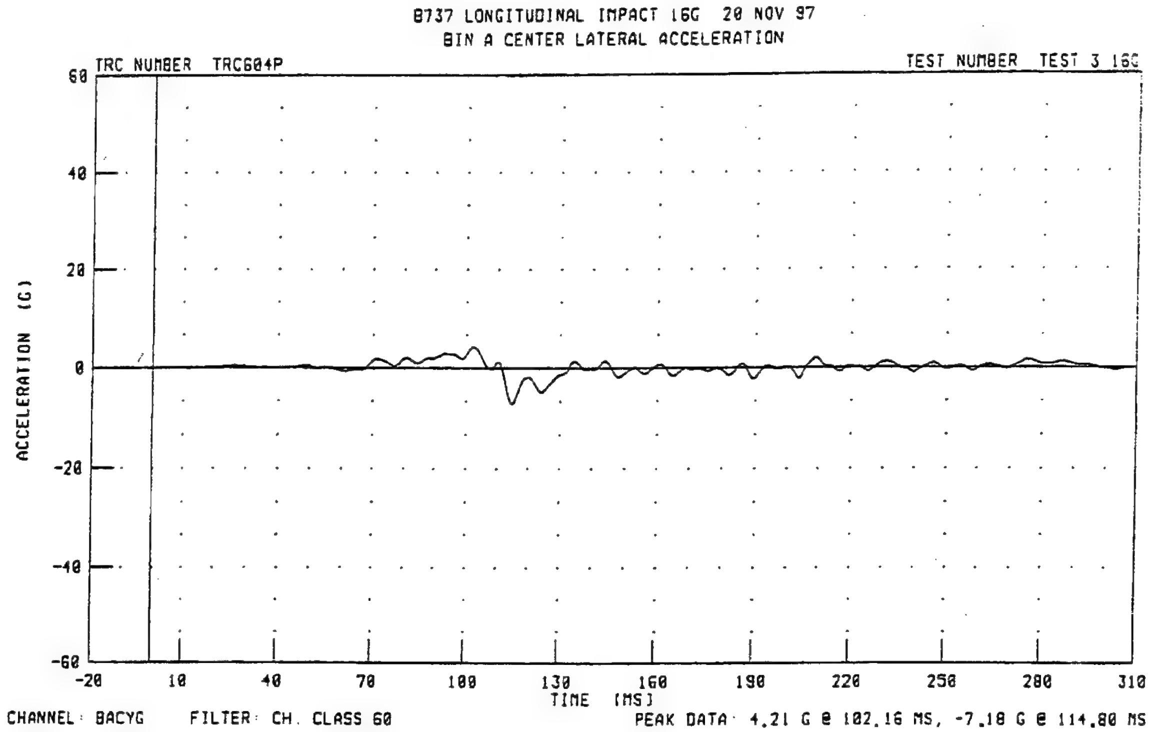
B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN A FRONT LATERAL ACCELERATION
TRC NUMBER TRC604P
TEST NUMBER TEST 3 16G
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BAFYG
FILTER: CH. CLASS 60
PEAK DATA: 5.65 G @ 106.48 MS, -9.40 G @ 124.96 MS



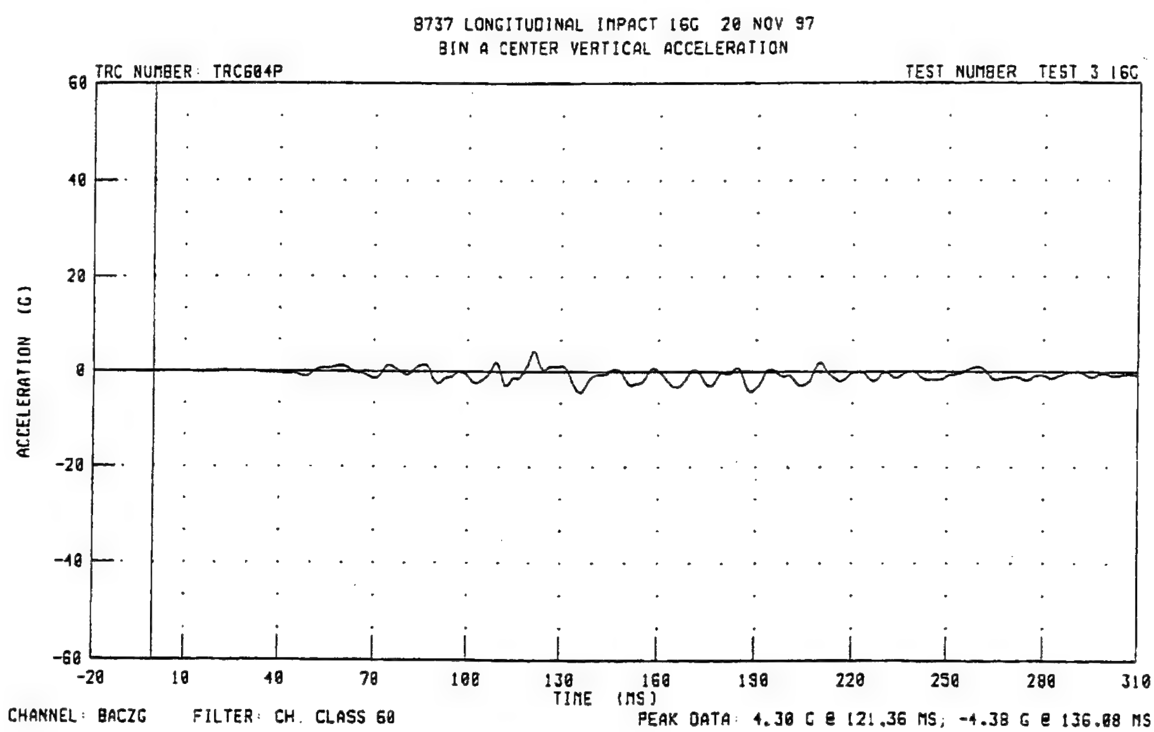
B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN A FRONT VERTICAL ACCELERATION
TRC NUMBER: TRC604P
TEST NUMBER: TEST 3 16G
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BAFZG
FILTER: CH. CLASS 60
PEAK DATA: 11.28 G @ 120.72 MS; -13.98 G @ 97.92 MS


B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN A FRONT LONGITUDINAL VELOCITY
TRC NUMBER: TRC604V
TEST NUMBER TEST 3 16G
VELOCITY (FT/S)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BAFXV
FILTER: CH. CLASS 180
PEAK DATA -0.01 FT/S @ -20.00 MS; -39.49 FT/S @ 310.00 MS

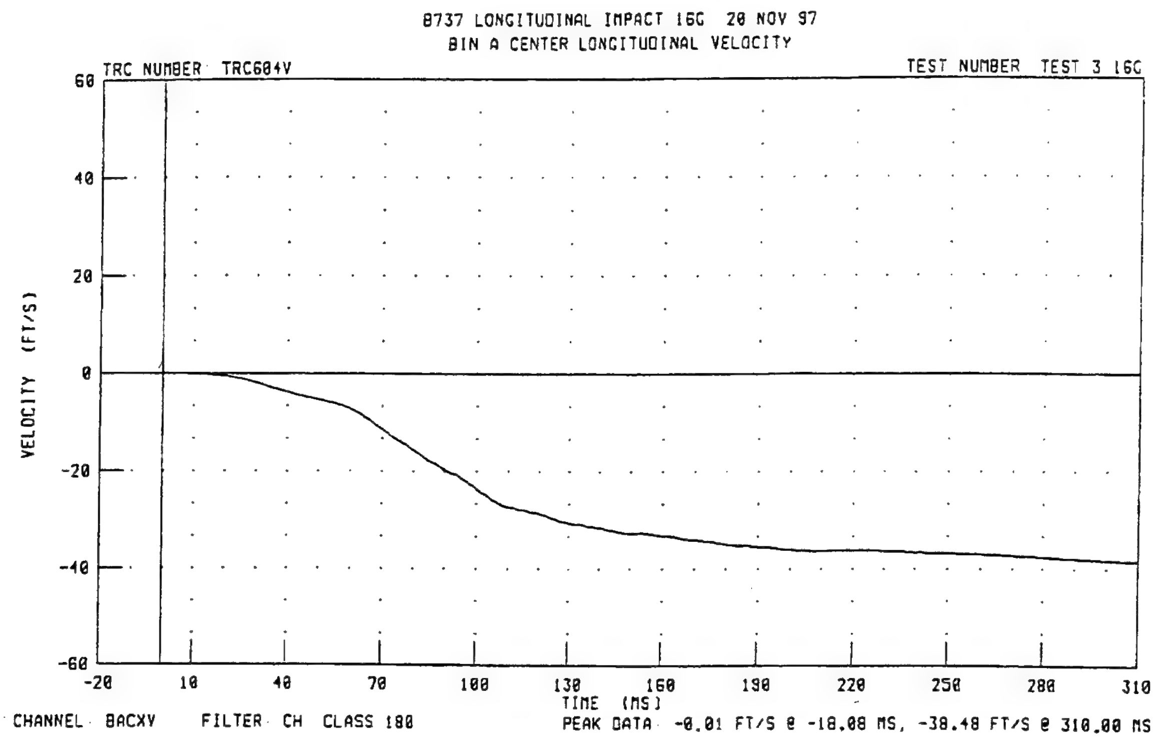

B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN A CENTER LONGITUDINAL ACCELERATION
TRC NUMBER: TRC604P
TEST NUMBER TEST 3 16G
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BACXG
FILTER: CH. CLASS 60
PEAK DATA: 1.15 G @ 212.00 MS; -15.04 G @ 99.92 MS



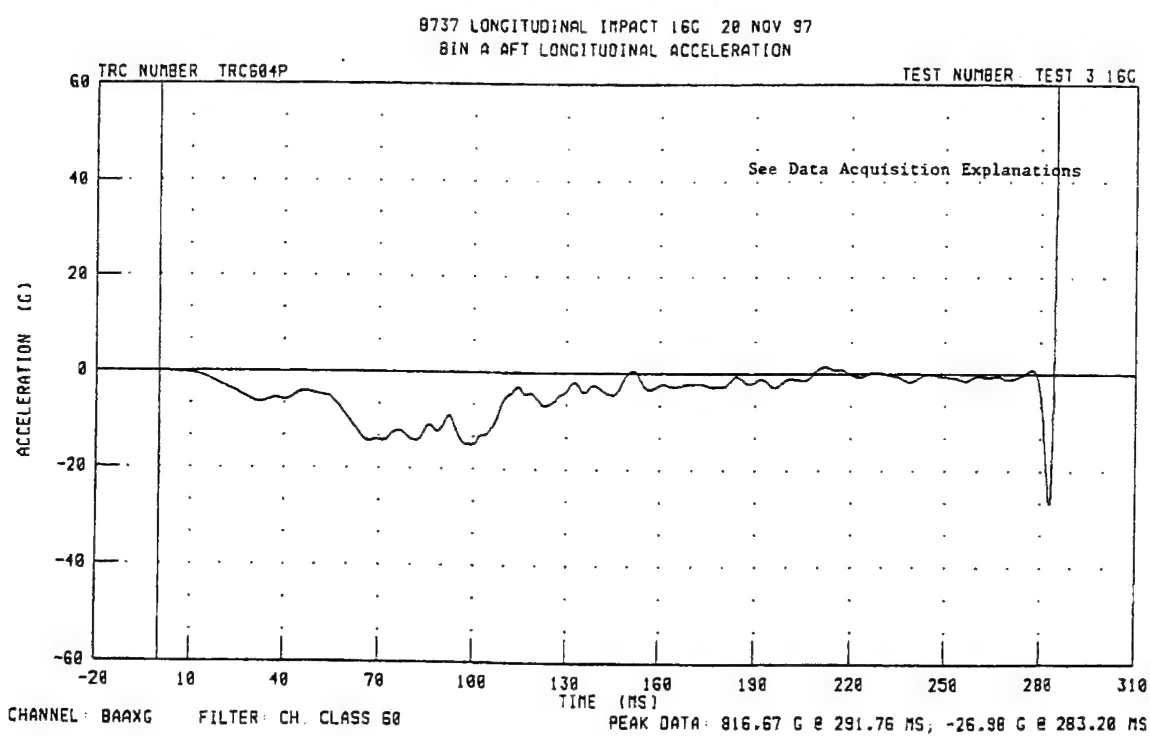
B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN A CENTER LATERAL ACCELERATION
TRC NUMBER TRC604P
TEST NUMBER TEST 3 16G
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20 10 40 70 100 130 160 190 220 250 280 310
TIME (MS)
CHANNEL: BACYG
FILTER: CH. CLASS 60
PEAK DATA: 4.21 G @ 102.16 MS, -7.18 G @ 114.80 MS



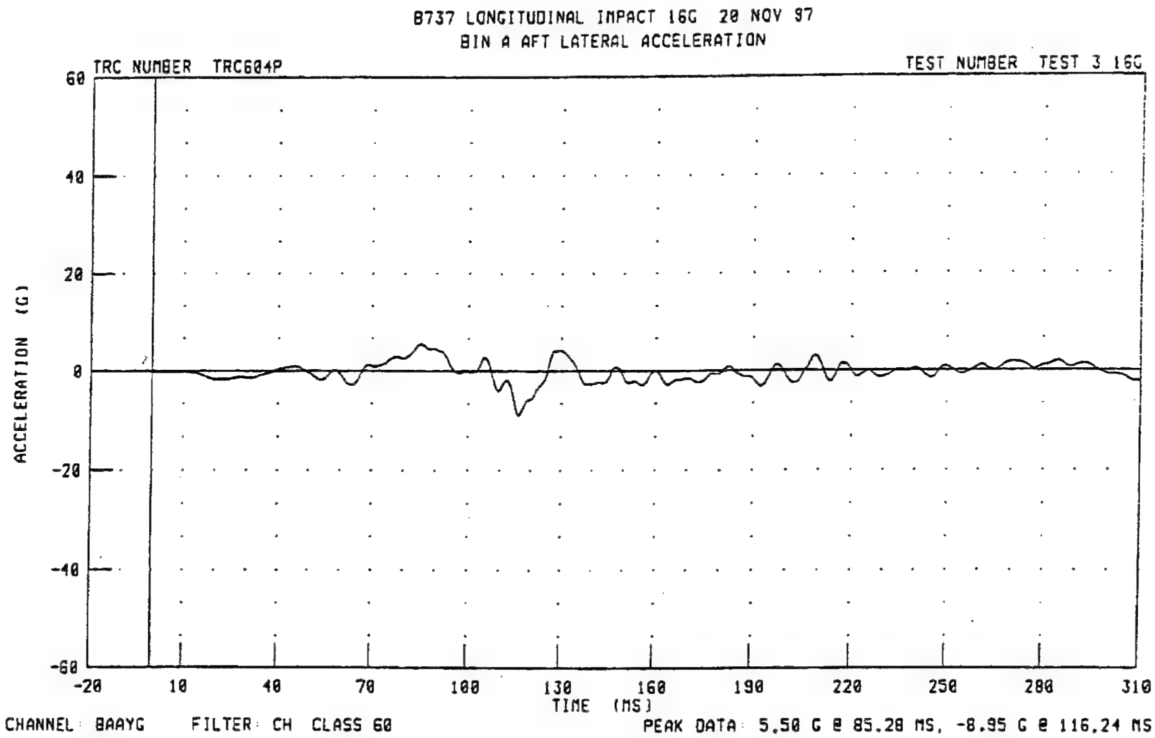
B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN A CENTER VERTICAL ACCELERATION
TRC NUMBER: TRC604P
TEST NUMBER TEST 3 16G
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20 10 40 70 100 130 160 190 220 250 280 310
TIME (MS)
CHANNEL: BACZG
FILTER: CH. CLASS 60
PEAK DATA: 4.30 G @ 121.36 MS, -4.38 G @ 136.08 MS

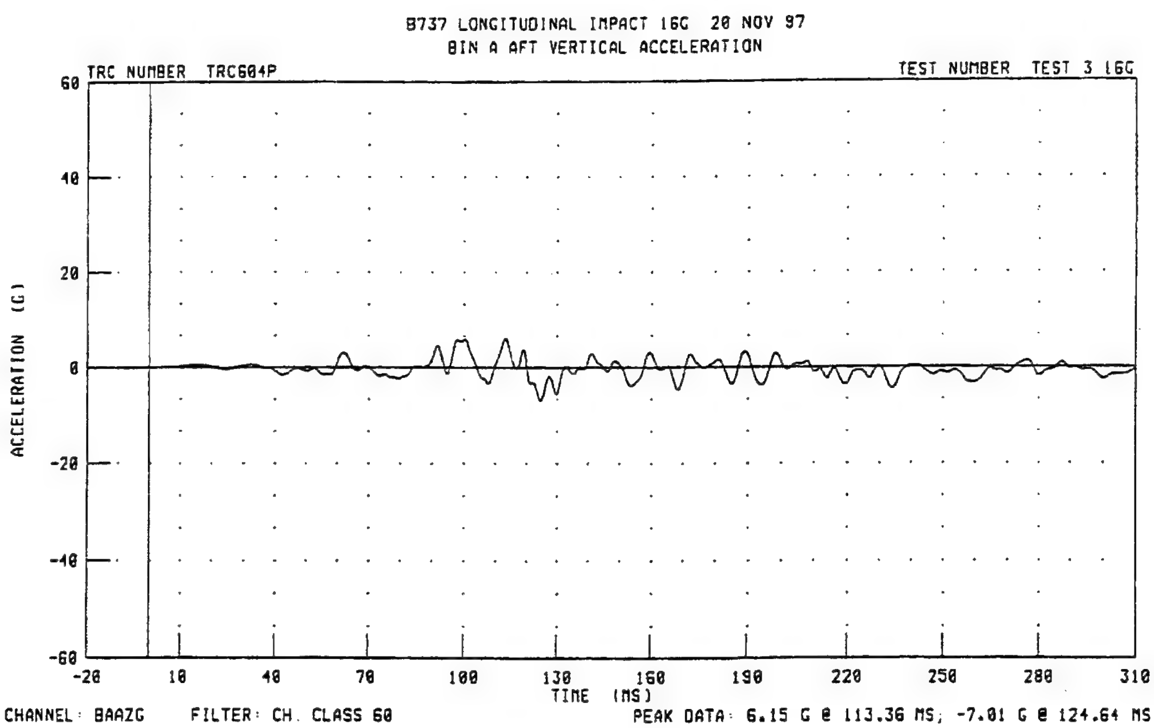


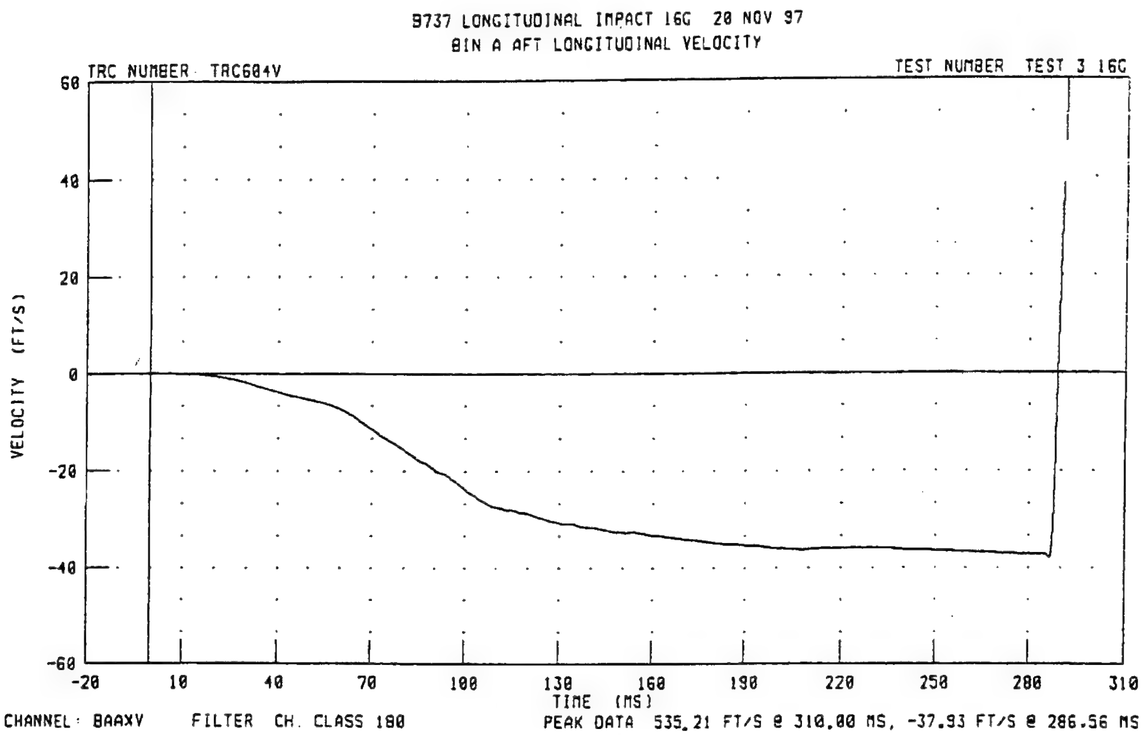
B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN A CENTER LONGITUDINAL VELOCITY
TRC NUMBER: TRC604V
TEST NUMBER: TEST 3 16G
VELOCITY (FT/S)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BACXV
FILTER: CH CLASS 180
PEAK DATA: -0.01 FT/S @ -18.08 MS, -38.48 FT/S @ 310.00 MS



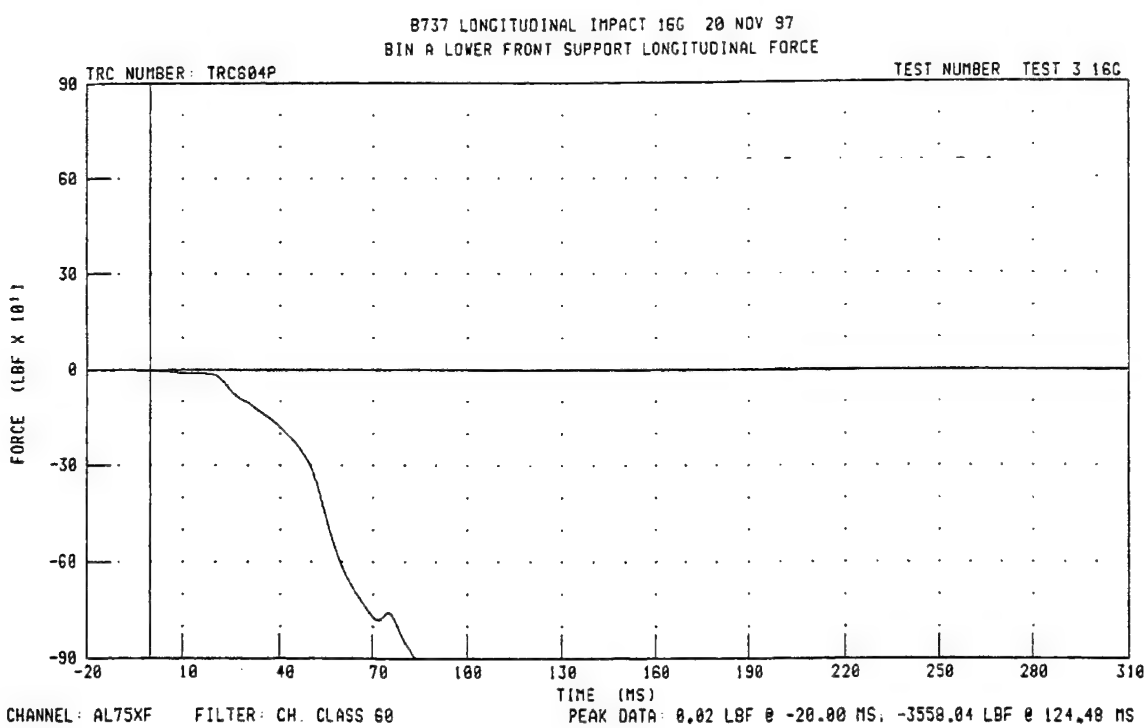
B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN A AFT LONGITUDINAL ACCELERATION
TRC NUMBER: TRC604P
TEST NUMBER: TEST 3 16G
See Data Acquisition Explanations
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BAAXG
FILTER: CH CLASS 60
PEAK DATA: 816.67 G @ 291.76 MS; -26.98 G @ 283.20 MS


B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN A AFT LATERAL ACCELERATION
TRC NUMBER TRC604P
TEST NUMBER TEST 3 16G
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BAAYG FILTER: CH CLASS 60
PEAK DATA: 5.50 G @ 85.28 MS, -8.95 G @ 116.24 MS

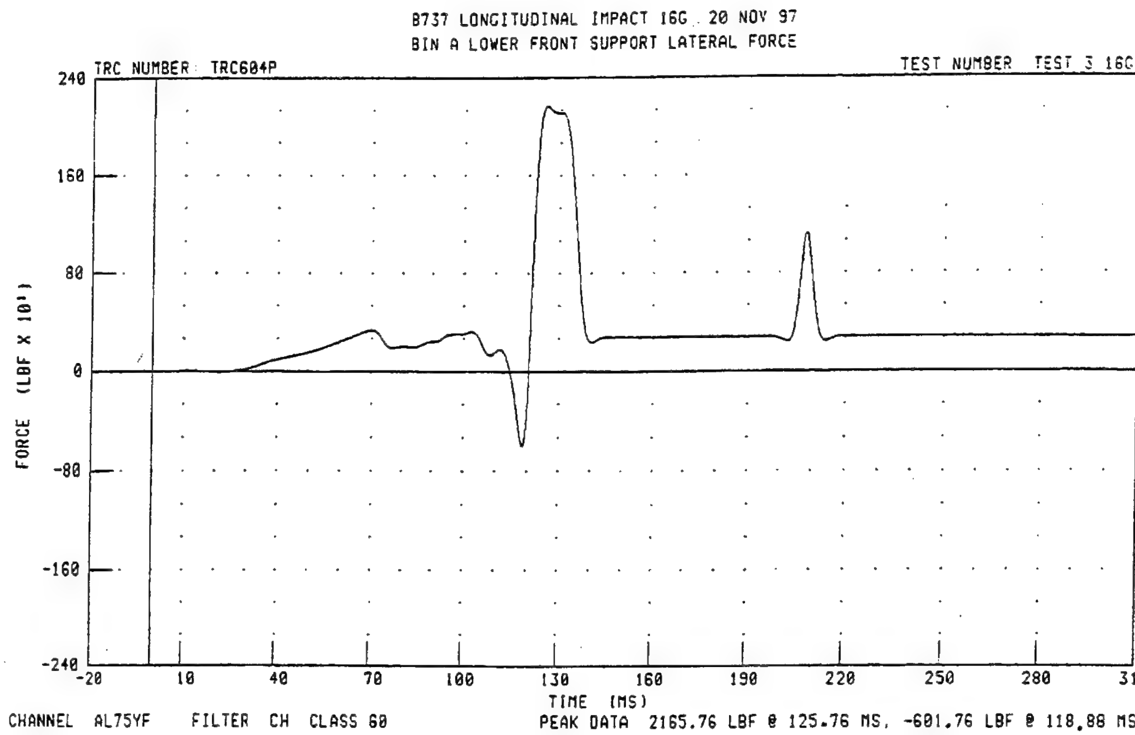

B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN A AFT VERTICAL ACCELERATION
TRC NUMBER TRC604P
TEST NUMBER TEST 3 16G
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BAAZG FILTER: CH. CLASS 60
PEAK DATA: 6.15 G @ 113.36 MS; -7.01 G @ 124.64 MS

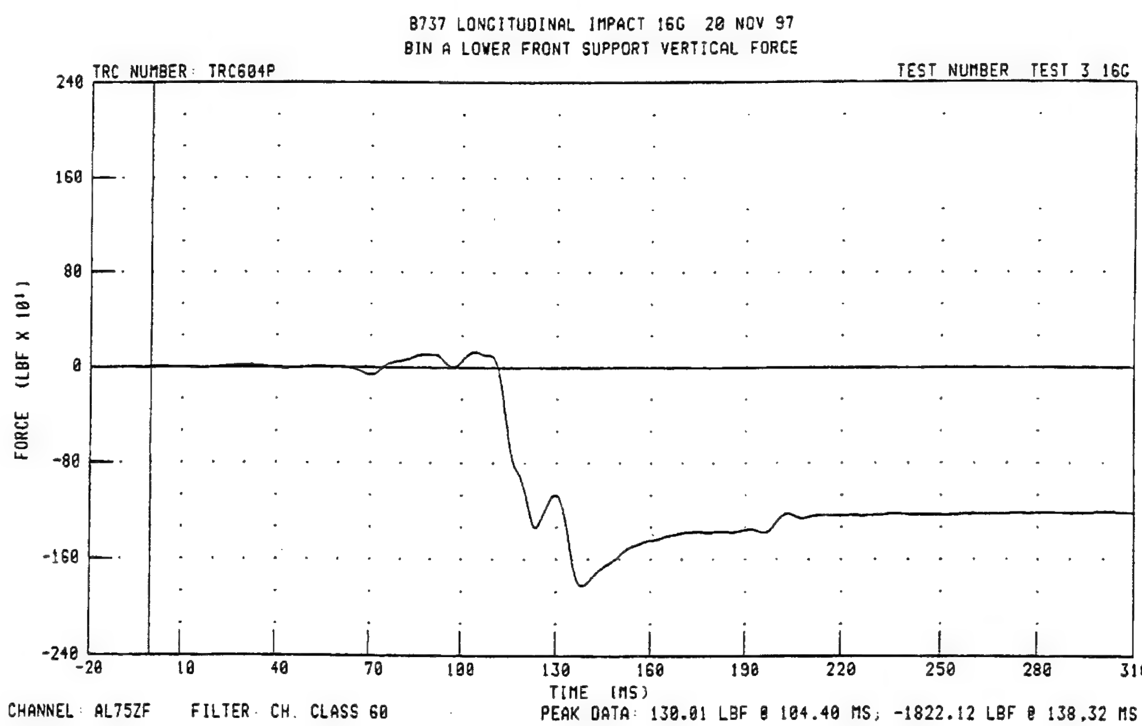


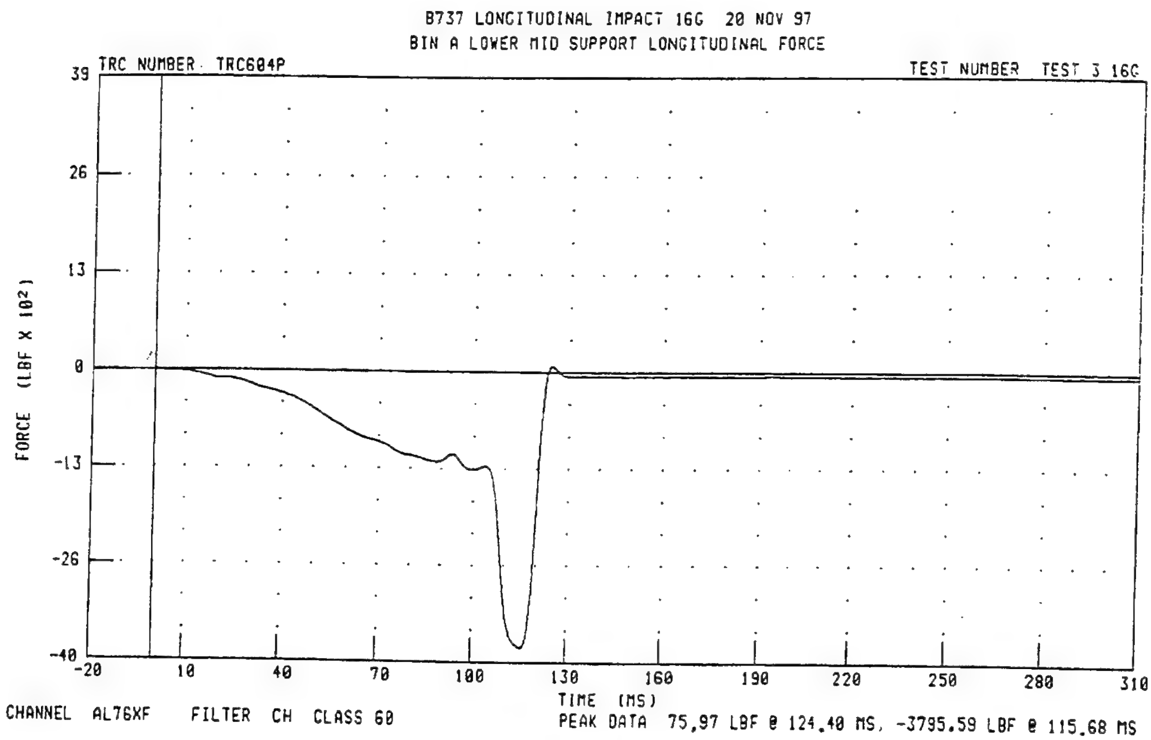
B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN A AFT LONGITUDINAL VELOCITY
TRC NUMBER: TRC604V
TEST NUMBER TEST 3 16G
VELOCITY (FT/S)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BAAXV
FILTER CH. CLASS 180
PEAK DATA 535.21 FT/S @ 310.00 MS, -37.93 FT/S @ 286.56 MS

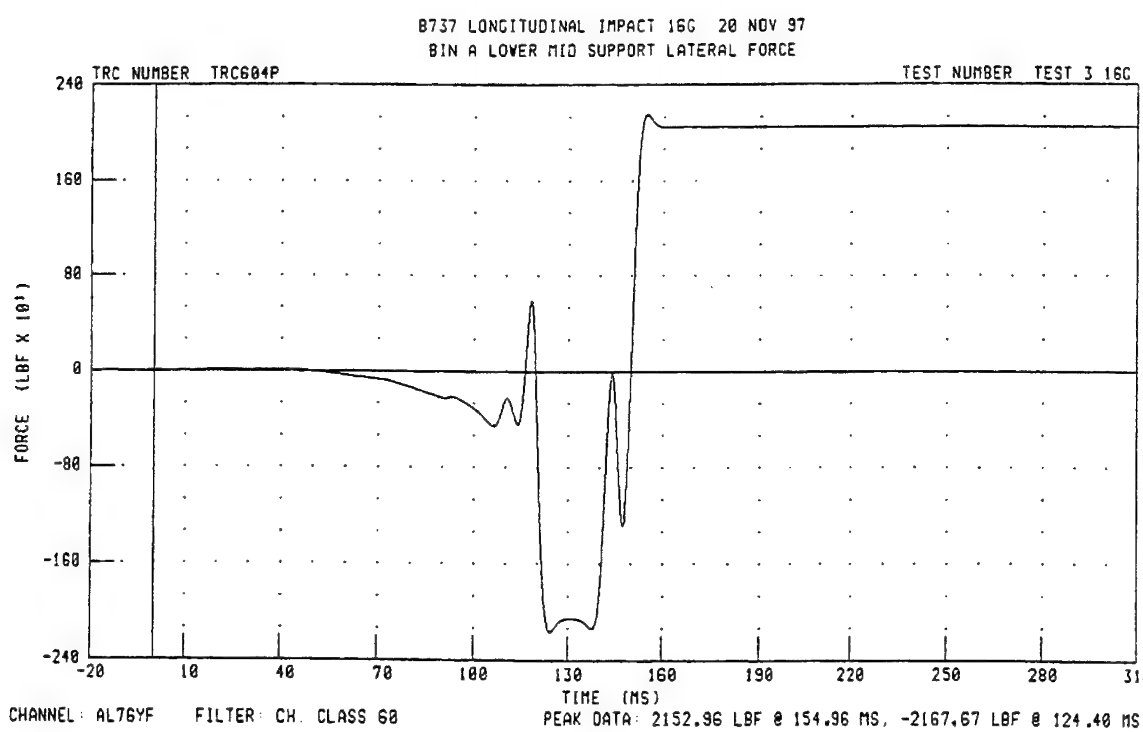


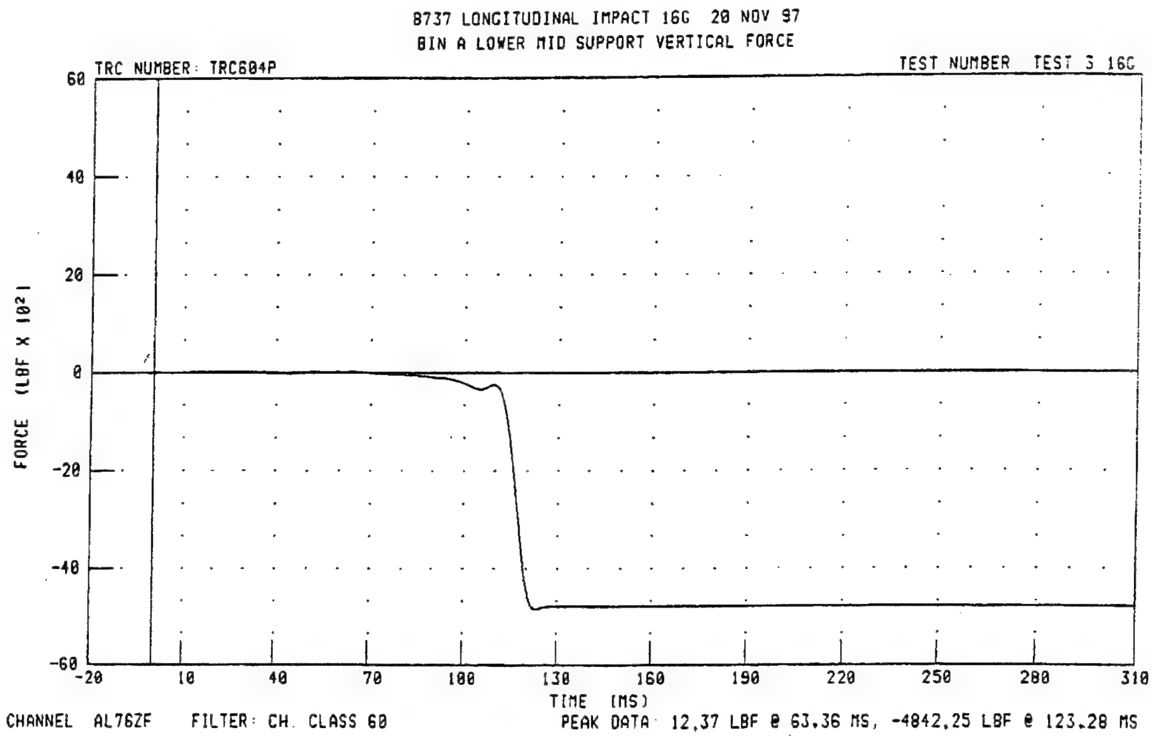
B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN A LOWER FRONT SUPPORT LONGITUDINAL FORCE
TRC NUMBER: TRC604P
TEST NUMBER TEST 3 16G
FORCE (LBF X 10¹)
90
60
30
0
-30
-60
-90
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: AL75XF
FILTER: CH. CLASS 60
PEAK DATA: 0.02 LBF @ -20.00 MS, -3558.04 LBF @ 124.40 MS

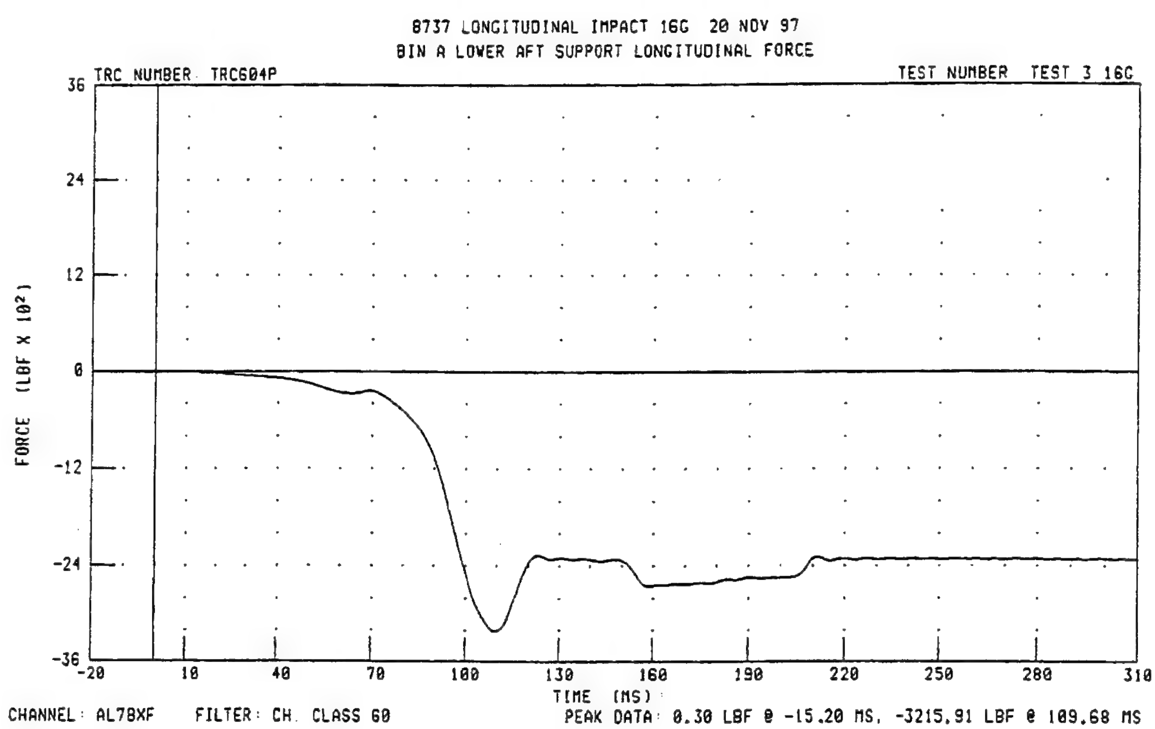

B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN A LOWER FRONT SUPPORT LATERAL FORCE
TRC NUMBER: TRC604P
TEST NUMBER TEST 3 16G
240
160
80
0
-80
-160
-240
FORCE (LBF X 10¹)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL AL75YF FILTER CH CLASS 60
PEAK DATA 2165.76 LBF @ 125.76 MS, -601.76 LBF @ 118.88 MS

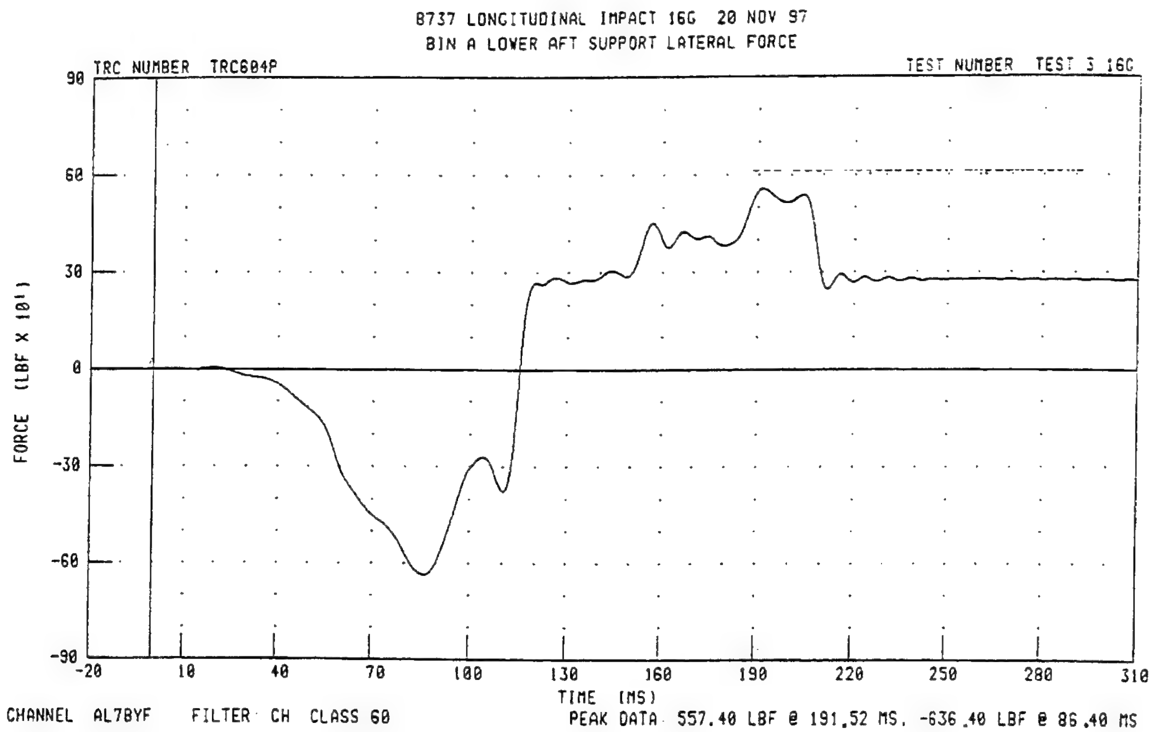

B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN A LOWER FRONT SUPPORT VERTICAL FORCE
TRC NUMBER: TRC604P
TEST NUMBER TEST 3 16G
240
160
80
0
-80
-160
-240
FORCE (LBF X 10¹)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: AL75ZF FILTER: CH. CLASS 60
PEAK DATA: 130.01 LBF @ 104.40 MS; -1822.12 LBF @ 138.32 MS


B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN A LOWER MID SUPPORT LONGITUDINAL FORCE
TRC NUMBER: TRC604P
TEST NUMBER TEST 3 16G
FORCE (LBF X 10²)
TIME (MS)
CHANNEL AL76XF FILTER CH CLASS 60
PEAK DATA 75.97 LBF @ 124.40 MS, -3795.59 LBF @ 115.68 MS

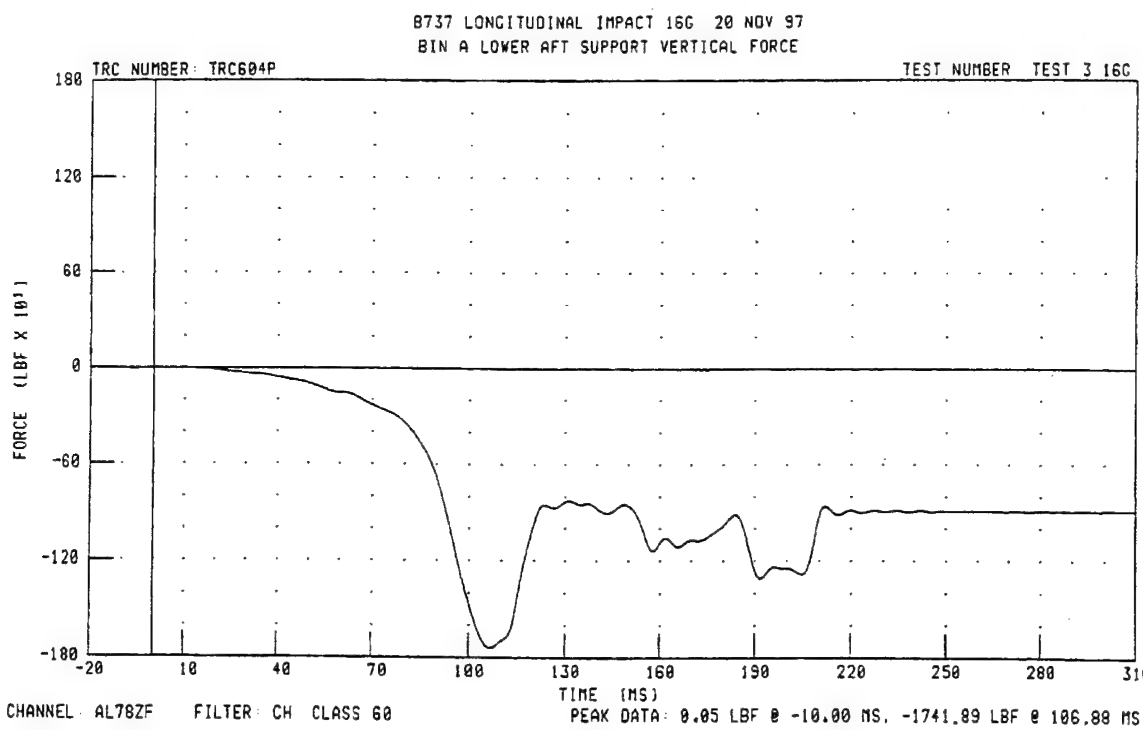

B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN A LOWER MID SUPPORT LATERAL FORCE
TRC NUMBER TRC604P
TEST NUMBER TEST 3 16G
FORCE (LBF X 10¹)
TIME (MS)
CHANNEL: AL76YF FILTER: CH. CLASS 60
PEAK DATA: 2152.96 LBF @ 154.96 MS, -2167.67 LBF @ 124.40 MS


B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN A LOWER MID SUPPORT VERTICAL FORCE
TRC NUMBER: TRC604P
TEST NUMBER TEST 3 16G
FORCE (LBF X 10²)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL AL76ZF
FILTER: CH. CLASS 60
PEAK DATA: 12.37 LBF @ 63.36 MS, -4842.25 LBF @ 123.28 MS

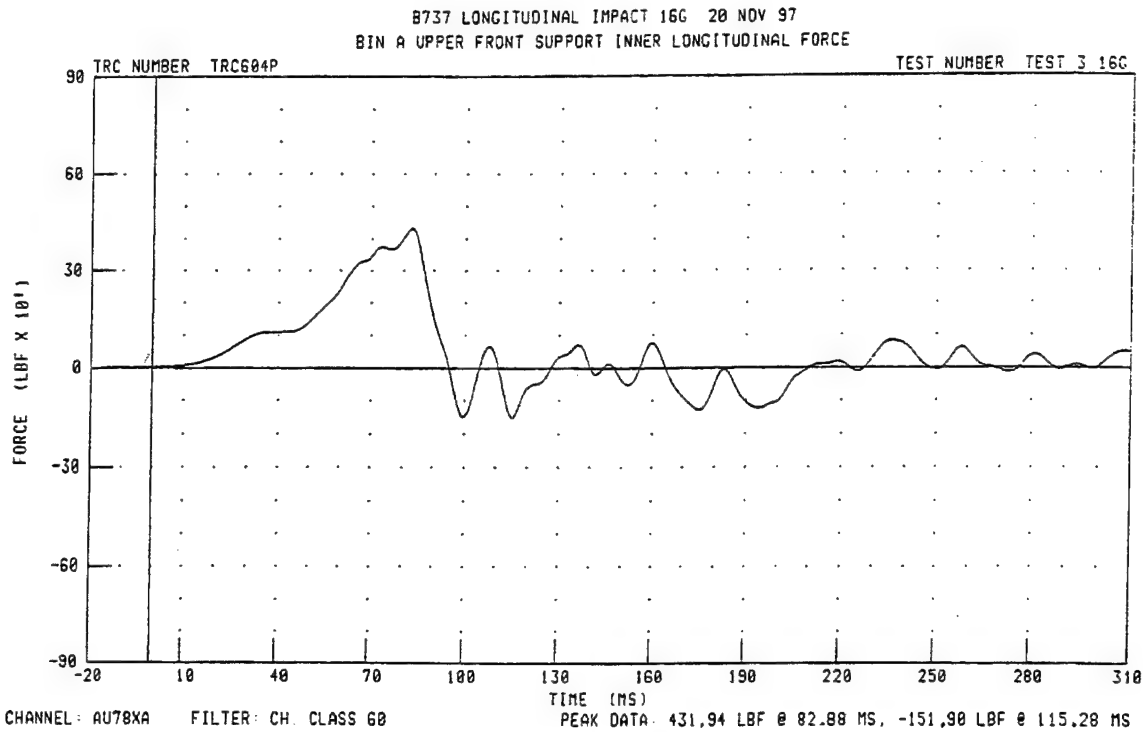

B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN A LOWER AFT SUPPORT LONGITUDINAL FORCE
TRC NUMBER: TRC604P
TEST NUMBER TEST 3 16G
FORCE (LBF X 10²)
36
24
12
0
-12
-24
-36
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: AL78XF
FILTER: CH. CLASS 60
PEAK DATA: 0.30 LBF @ -15.20 MS, -3215.91 LBF @ 109.68 MS

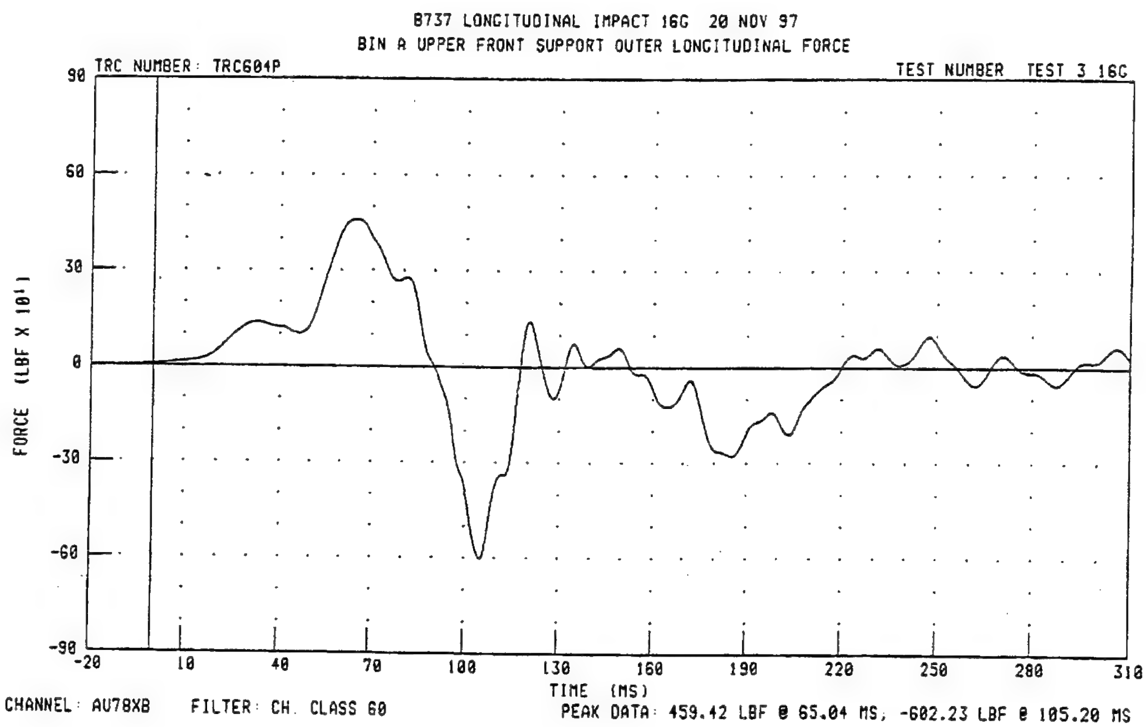


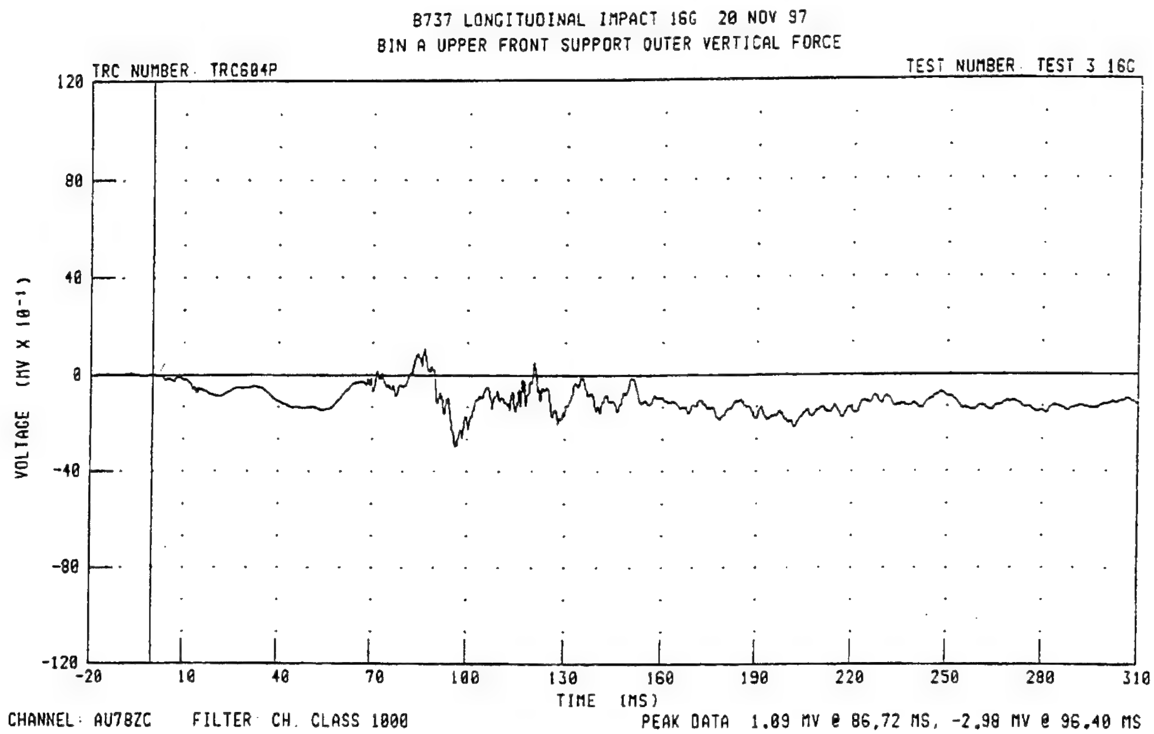
B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN A LOWER AFT SUPPORT LATERAL FORCE
TRC NUMBER TRC604P
TEST NUMBER TEST 3 16G
FORCE (LBF X 10¹)
90
60
30
0
-30
-60
-90
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL AL7BYF
FILTER CH CLASS 60
PEAK DATA 557.40 LBF @ 191.52 MS, -636.40 LBF @ 86.40 MS

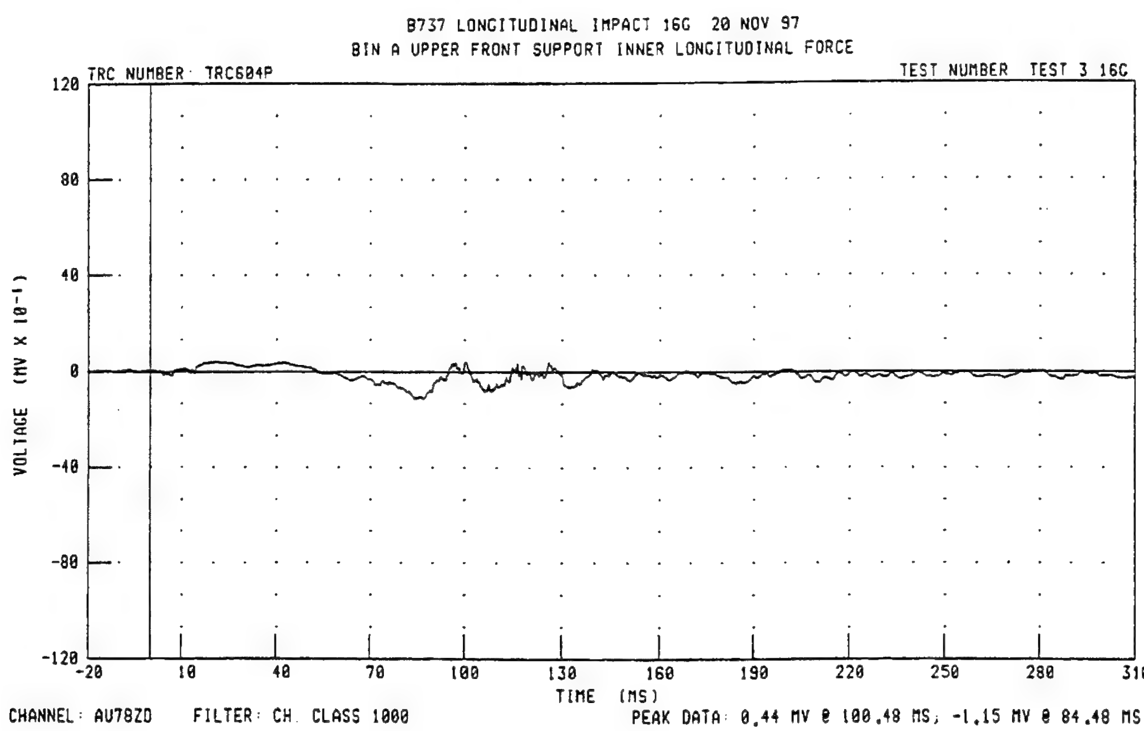


B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN A LOWER AFT SUPPORT VERTICAL FORCE
TRC NUMBER: TRC604P
TEST NUMBER TEST 3 16G
FORCE (LBF X 10¹)
180
120
60
0
-60
-120
-180
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL AL7BZF
FILTER CH CLASS 60
PEAK DATA: 0.05 LBF @ -10.00 MS, -1741.89 LBF @ 106.88 MS

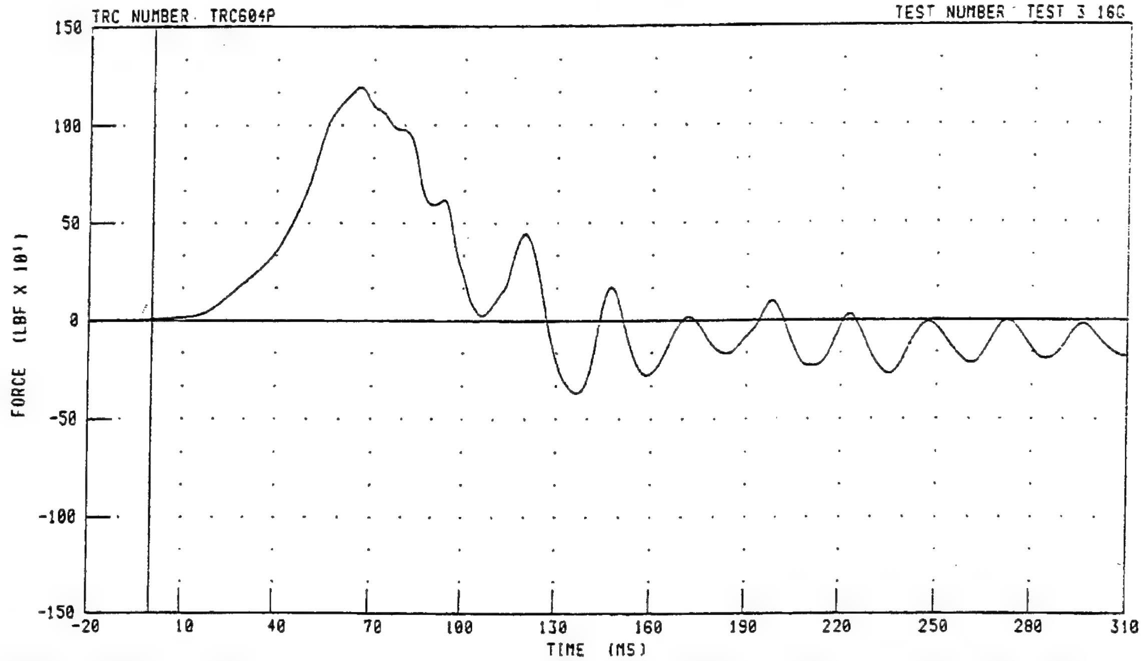

B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN A UPPER FRONT SUPPORT INNER LONGITUDINAL FORCE
TRC NUMBER TRC604P
TEST NUMBER TEST 3 16G
FORCE (LBF X 10¹)
TIME (MS)
CHANNEL: AU78XA FILTER: CH. CLASS 60
PEAK DATA: 431.94 LBF @ 82.88 MS, -151.90 LBF @ 115.28 MS


B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN A UPPER FRONT SUPPORT OUTER LONGITUDINAL FORCE
TRC NUMBER: TRC604P
TEST NUMBER TEST 3 16G
FORCE (LBF X 10¹)
TIME (MS)
CHANNEL: AU78XB FILTER: CH. CLASS 60
PEAK DATA: 459.42 LBF @ 65.04 MS, -602.23 LBF @ 105.20 MS


B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN A UPPER FRONT SUPPORT OUTER VERTICAL FORCE
TRC NUMBER: TRC604P
TEST NUMBER: TEST 3 16G
VOLTAGE (MV X 10⁻¹)
120
80
40
0
-40
-80
-120
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: AU78ZC
FILTER: CH. CLASS 1000
PEAK DATA 1.09 MV @ 86.72 MS, -2.98 MV @ 96.40 MS

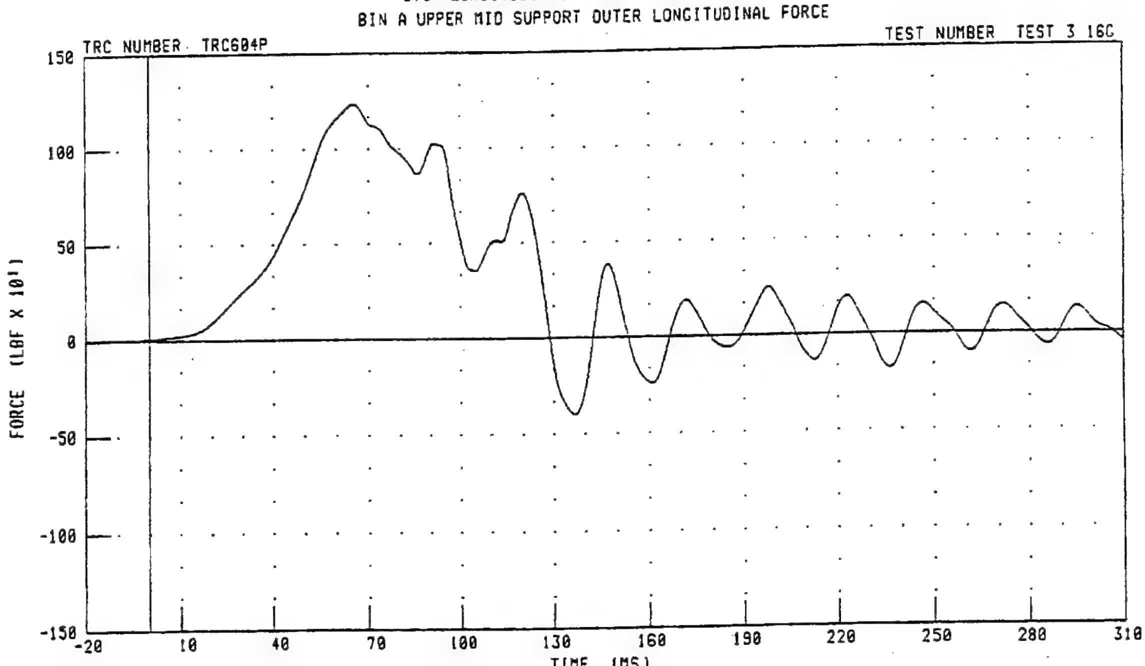

B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN A UPPER FRONT SUPPORT INNER LONGITUDINAL FORCE
TRC NUMBER: TRC604P
TEST NUMBER TEST 3 16G
VOLTAGE (MV X 10⁻¹)
120
80
40
0
-40
-80
-120
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: AU78ZD
FILTER: CH. CLASS 1000
PEAK DATA: 0.44 MV @ 100.48 MS; -1.15 MV @ 84.48 MS

B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN A UPPER MID SUPPORT INNER LONGITUDINAL FORCE

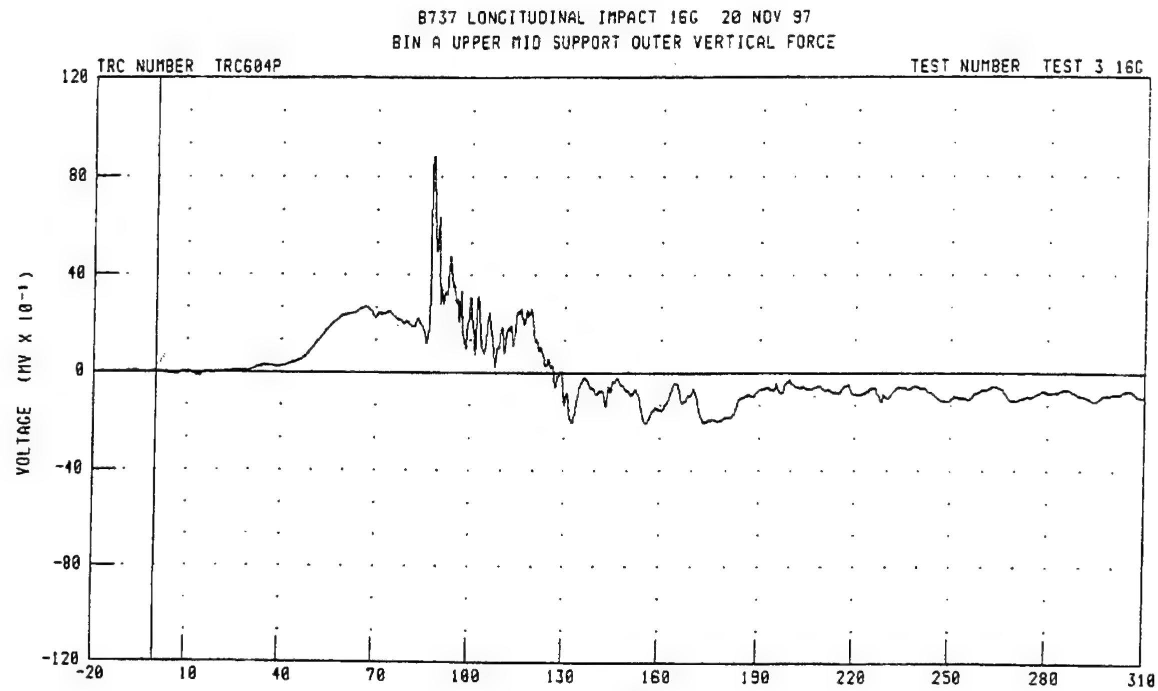


CHANNEL: AU76XA FILTER: CH CLASS 60 PEAK DATA 1193.58 LBF @ 65.84 MS, -369.44 LBF @ 136.56 MS

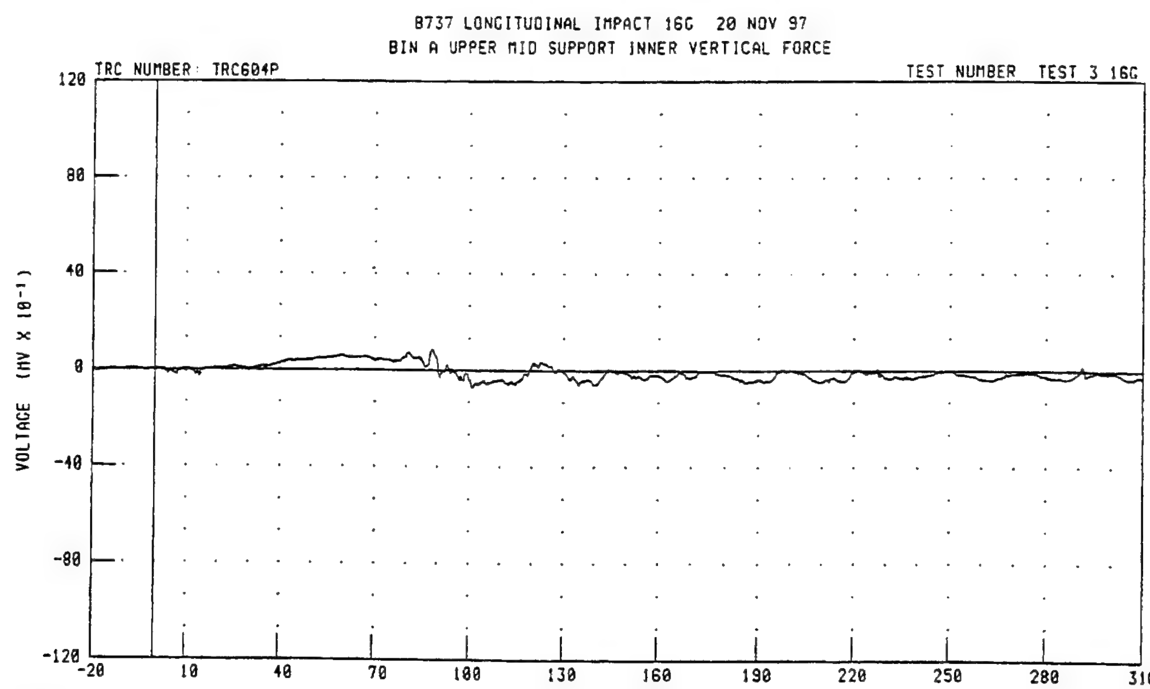
B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN A UPPER MID SUPPORT OUTER LONGITUDINAL FORCE



CHANNEL: AU76XB FILTER: CH. CLASS 60 PEAK DATA: 1235.34 LBF @ 65.60 MS, -401.17 LBF @ 136.80 MS

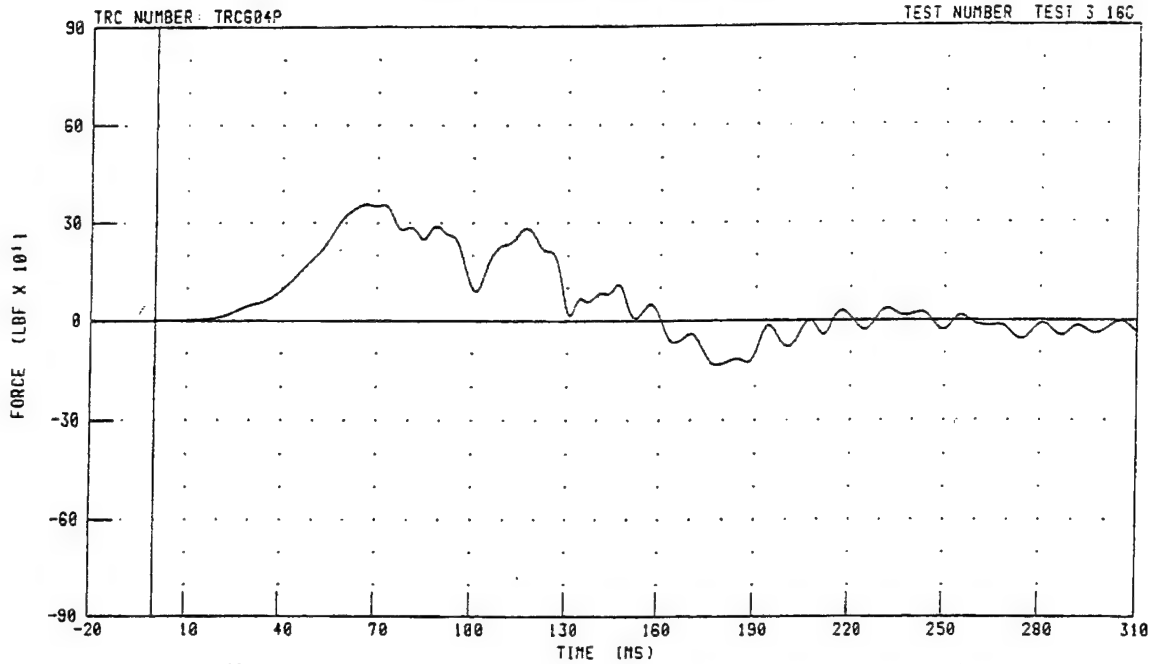


CHANNEL: AU76ZC FILTER: CH CLASS 1000 PEAK DATA 8.84 MV @ 88.00 MS, -2.08 MV @ 155.92 MS



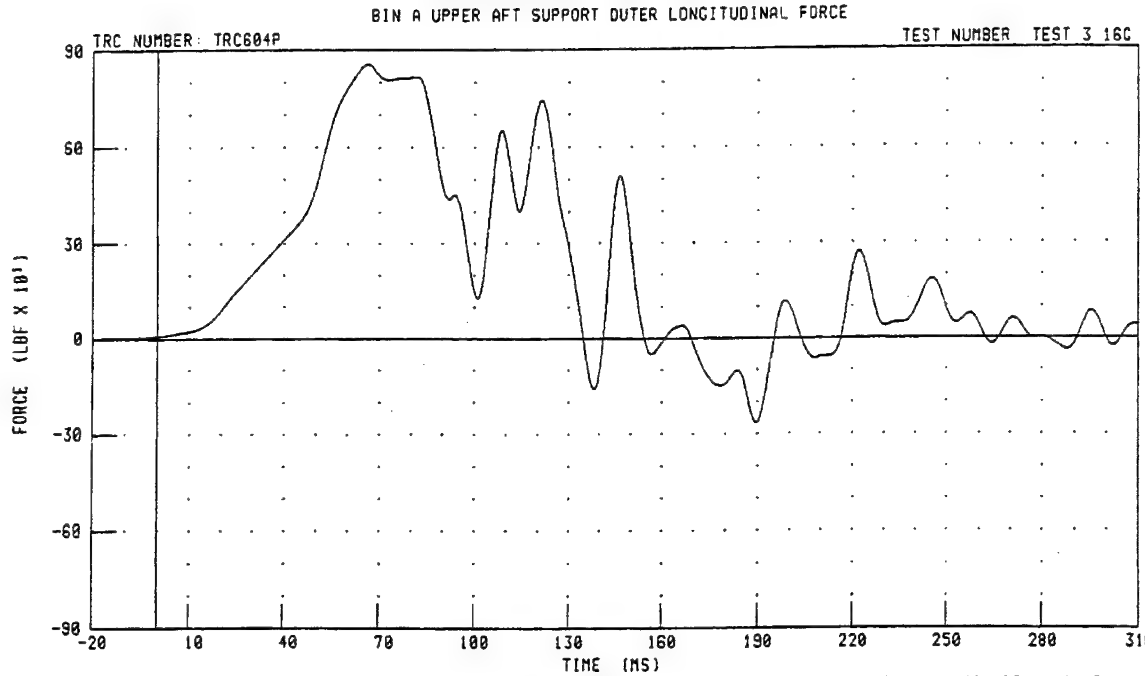
CHANNEL: AU76ZD FILTER: CH CLASS 1000 PEAK DATA: 0.84 MV @ 88.24 MS, -0.76 MV @ 101.20 MS

B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN A UPPER AFT SUPPORT INNER LONGITUDINAL FORCE

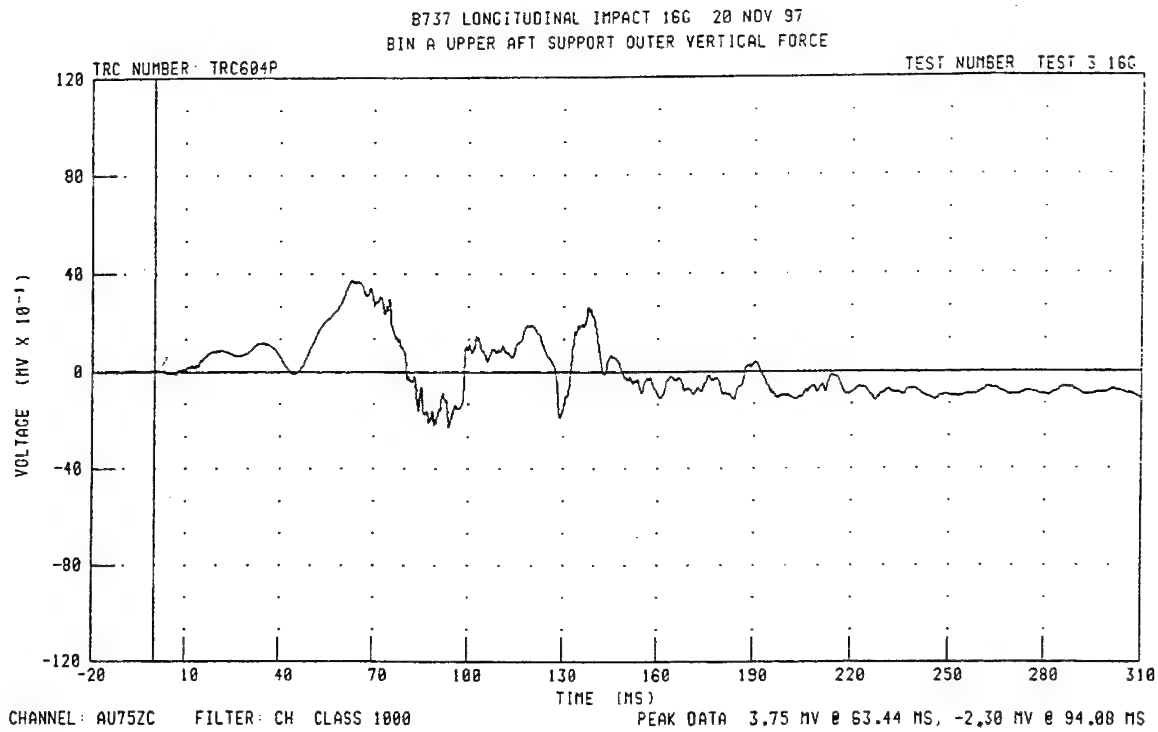


CHANNEL: AU75XA FILTER: CH. CLASS 60 PEAK DATA: 357.29 LBF @ 66.56 MS, -136.35 LBF @ 177.84 MS

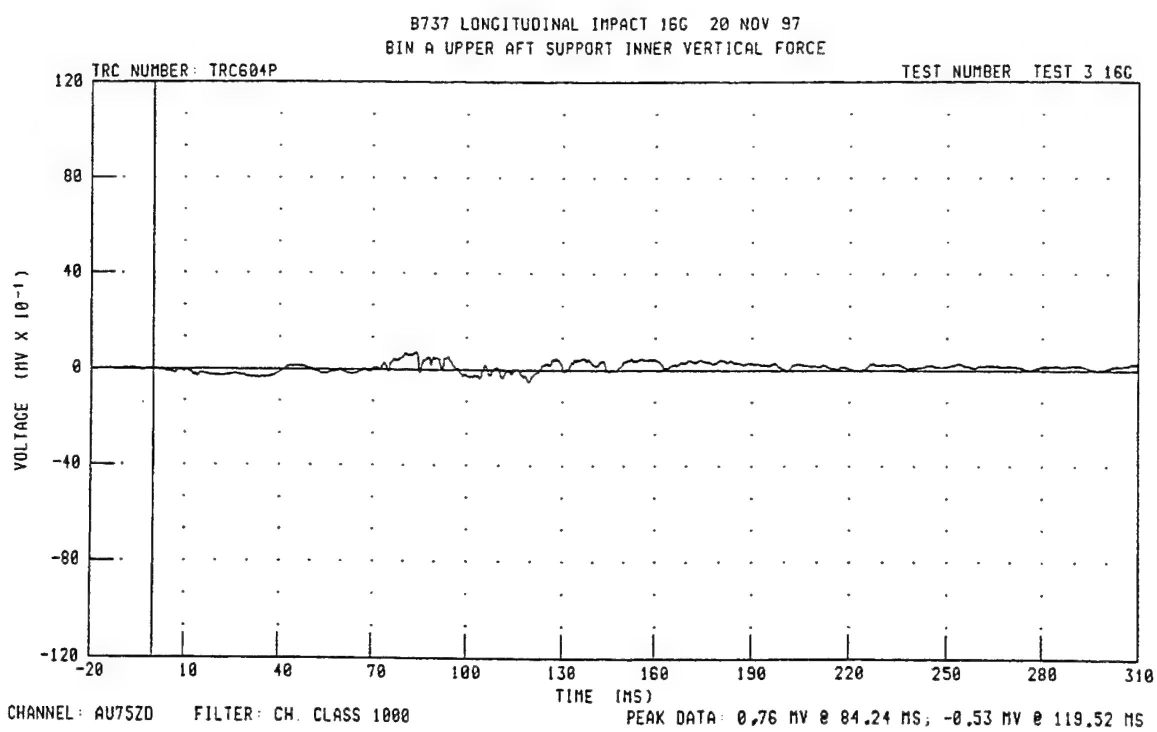
B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN A UPPER AFT SUPPORT OUTER LONGITUDINAL FORCE



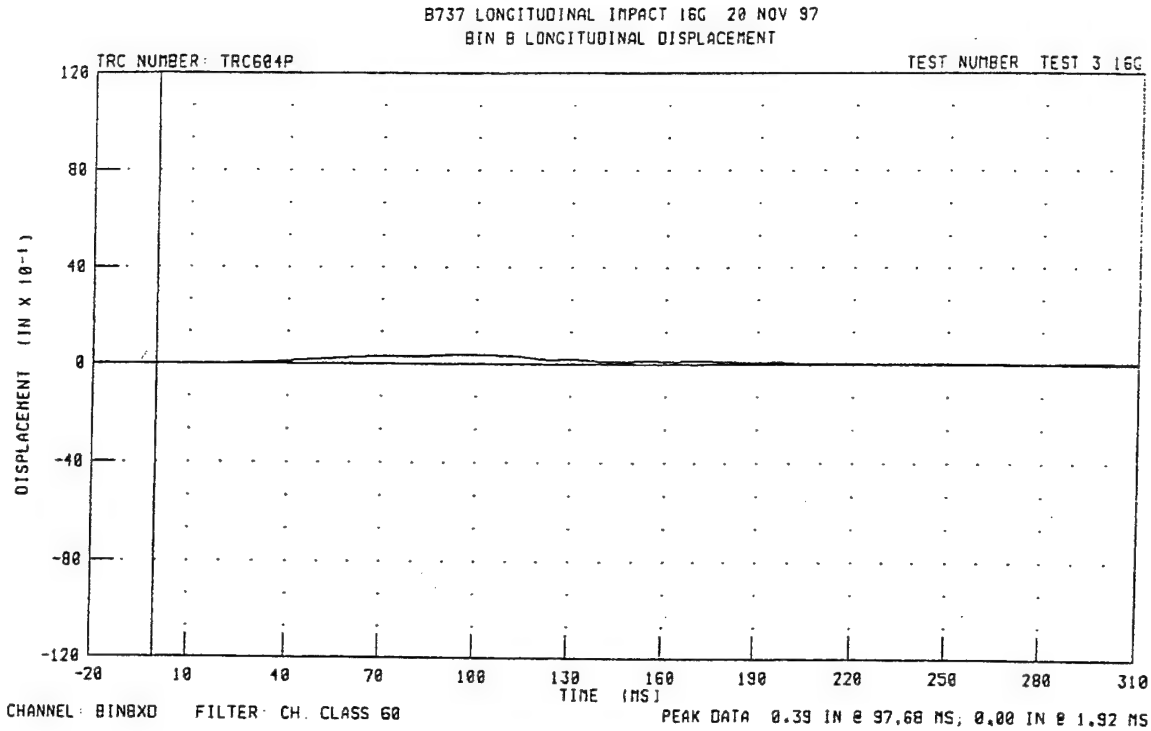
CHANNEL: AU75XB FILTER: CH. CLASS 60 PEAK DATA: 855.66 LBF @ 66.32 MS; -265.86 LBF @ 189.76 MS



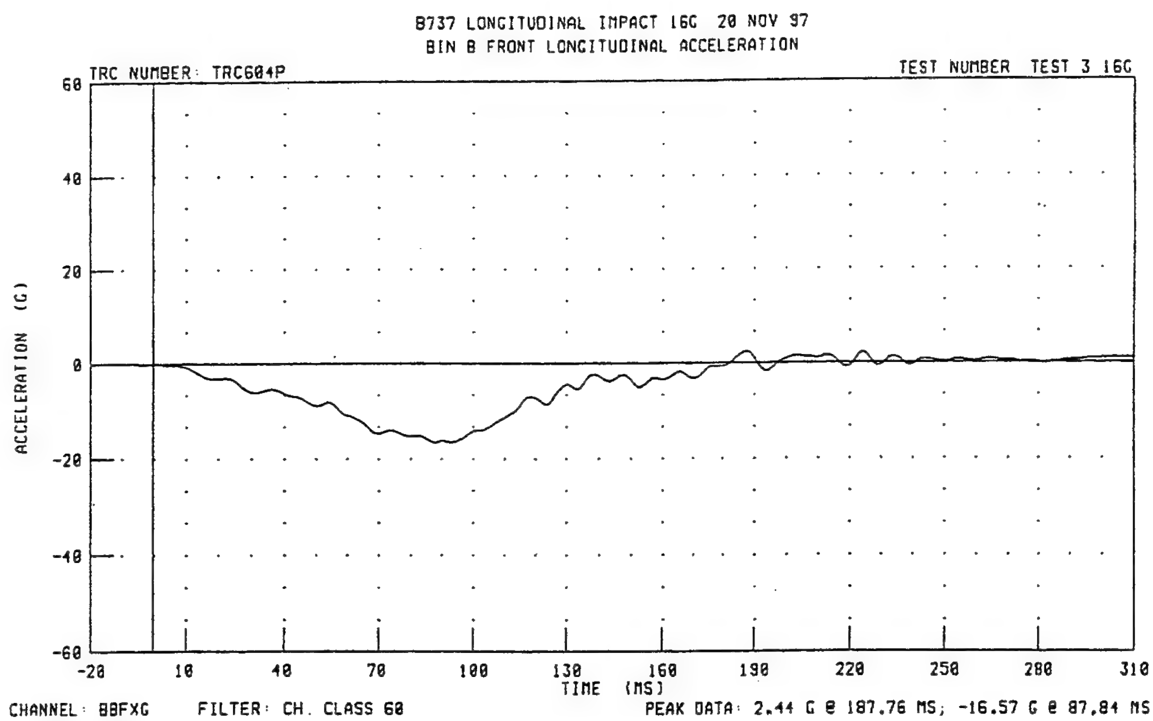
B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN A UPPER AFT SUPPORT OUTER VERTICAL FORCE
TRC NUMBER: TRC604P
TEST NUMBER TEST 3 16G
VOLTAGE (MV X 10⁻¹)
120
80
40
0
-40
-80
-120
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: AU75ZC FILTER: CH CLASS 1000
PEAK DATA 3.75 MV @ 63.44 MS, -2.30 MV @ 94.08 MS



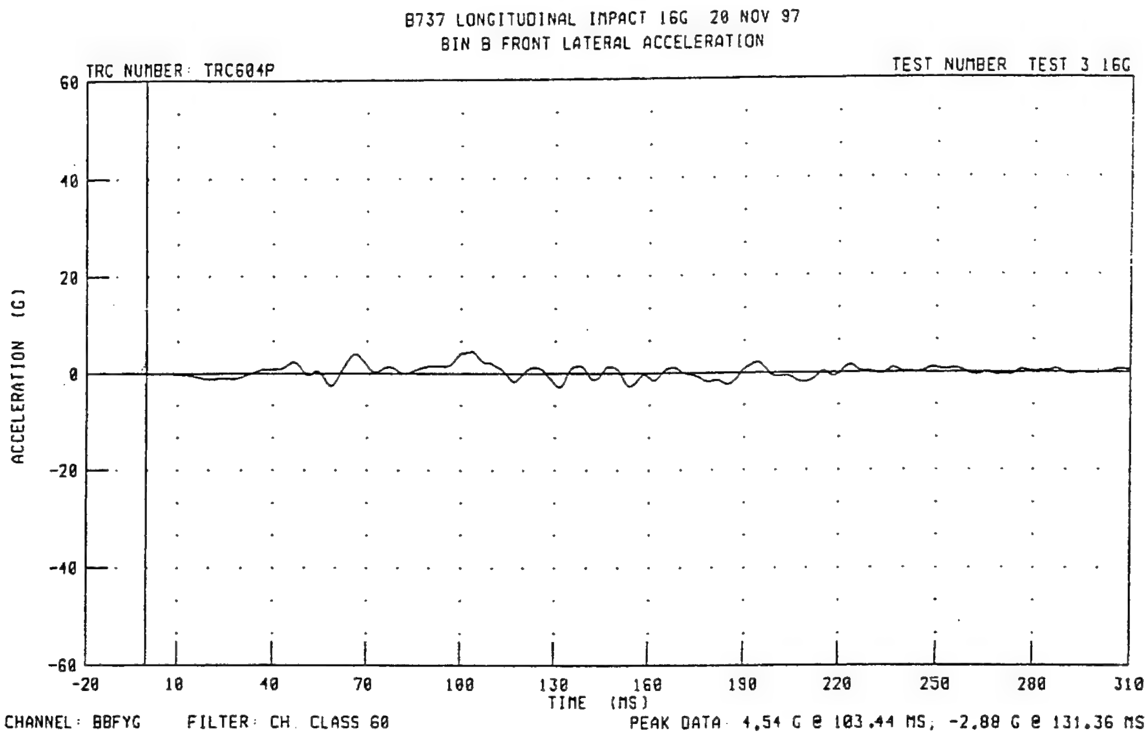
B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN A UPPER AFT SUPPORT INNER VERTICAL FORCE
TRC NUMBER: TRC604P
TEST NUMBER TEST 3 16G
VOLTAGE (MV X 10⁻¹)
120
80
40
0
-40
-80
-120
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: AU75ZD FILTER: CH. CLASS 1000
PEAK DATA: 0.76 MV @ 84.24 MS; -0.53 MV @ 119.52 MS



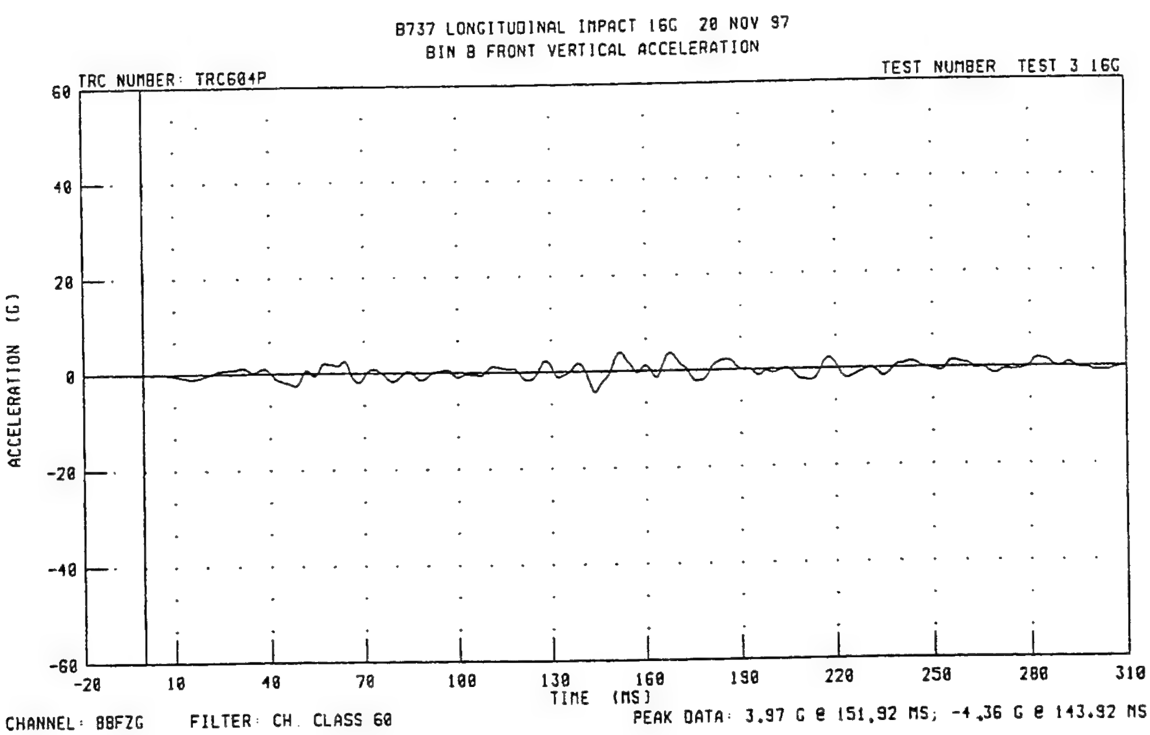
B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN B LONGITUDINAL DISPLACEMENT
TRC NUMBER: TRC604P
TEST NUMBER TEST 3 16G
DISPLACEMENT (IN X 10⁻¹)
120
80
40
0
-40
-80
-120
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BINBXD
FILTER: CH. CLASS 60
PEAK DATA 0.39 IN @ 97.68 MS; 0.00 IN @ 1.92 MS



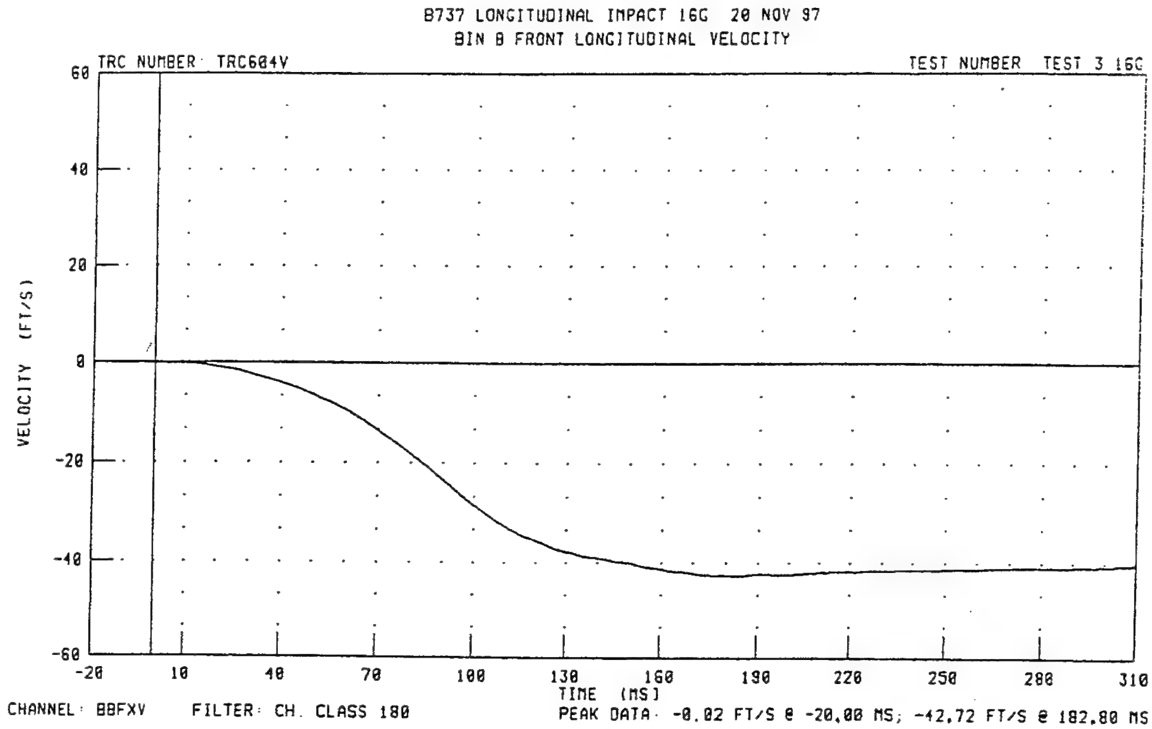
B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN B FRONT LONGITUDINAL ACCELERATION
TRC NUMBER: TRC604P
TEST NUMBER TEST 3 16G
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BBFXG
FILTER: CH. CLASS 60
PEAK DATA: 2.44 G @ 187.76 MS; -16.57 G @ 87.84 MS



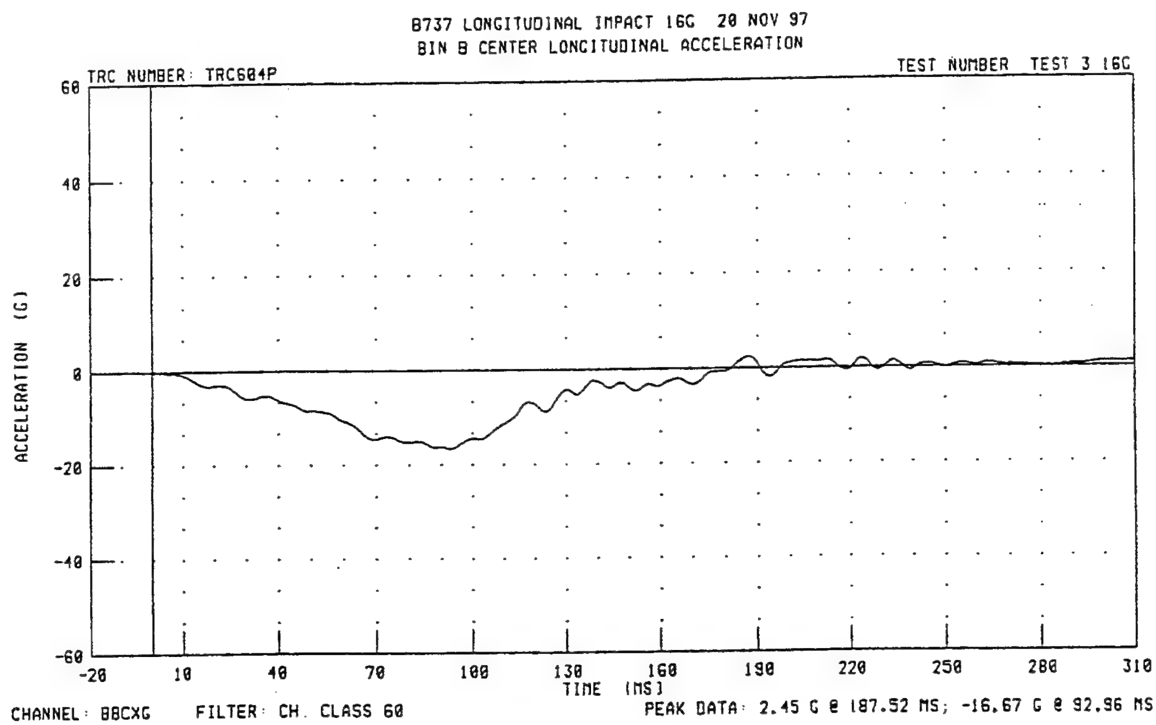
B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN B FRONT LATERAL ACCELERATION
TRC NUMBER: TRC604P
TEST NUMBER TEST 3 16G
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BBFYG
FILTER: CH. CLASS 60
PEAK DATA: 4.54 G @ 103.44 MS; -2.88 G @ 131.36 MS



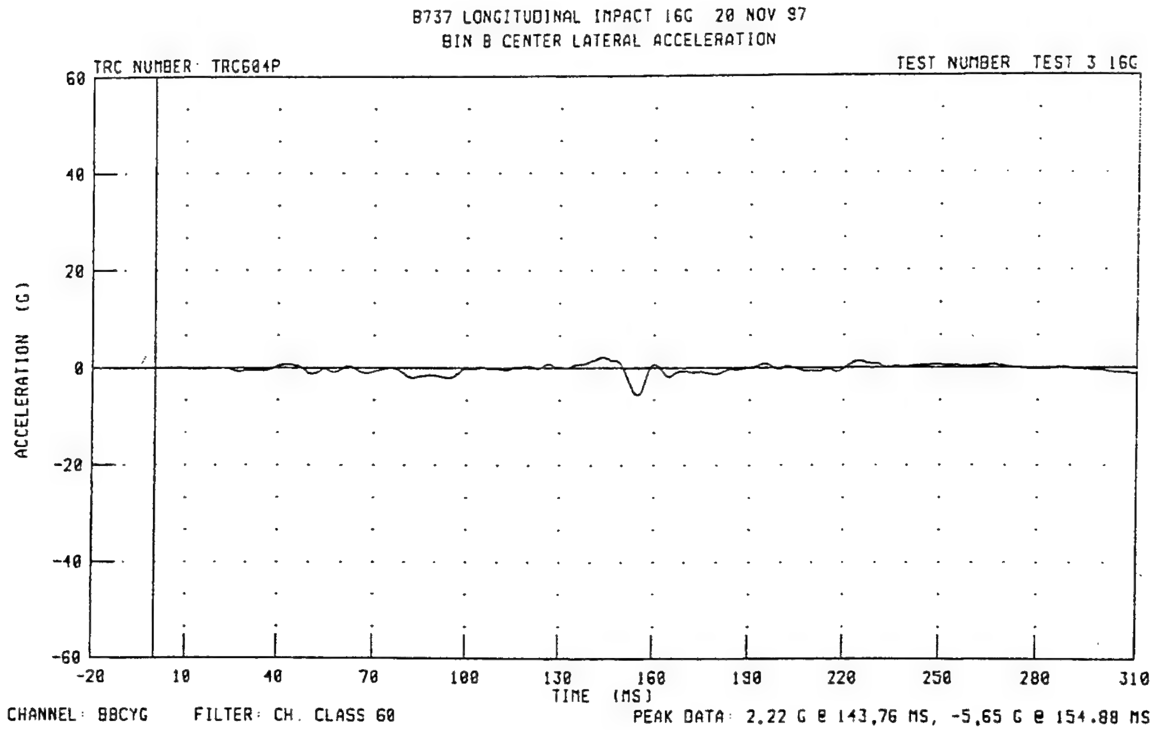
B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN B FRONT VERTICAL ACCELERATION
TRC NUMBER: TRC604P
TEST NUMBER TEST 3 16G
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BBFZG
FILTER: CH. CLASS 60
PEAK DATA: 3.97 G @ 151.92 MS; -4.36 G @ 143.92 MS

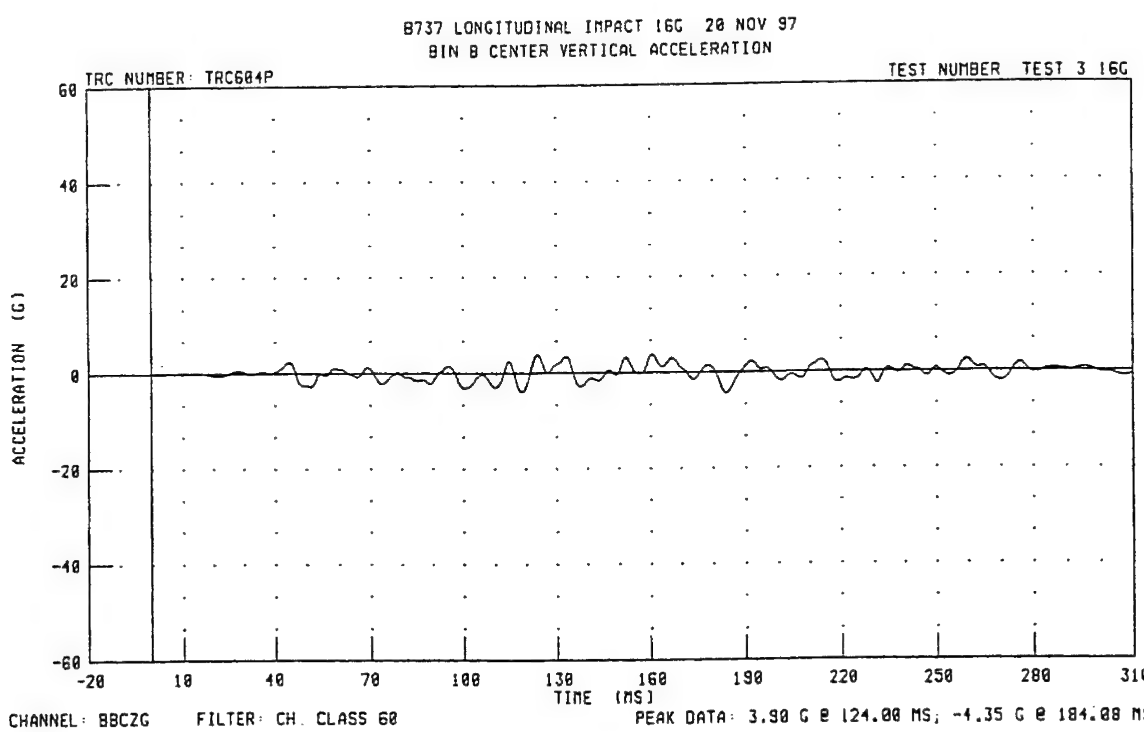


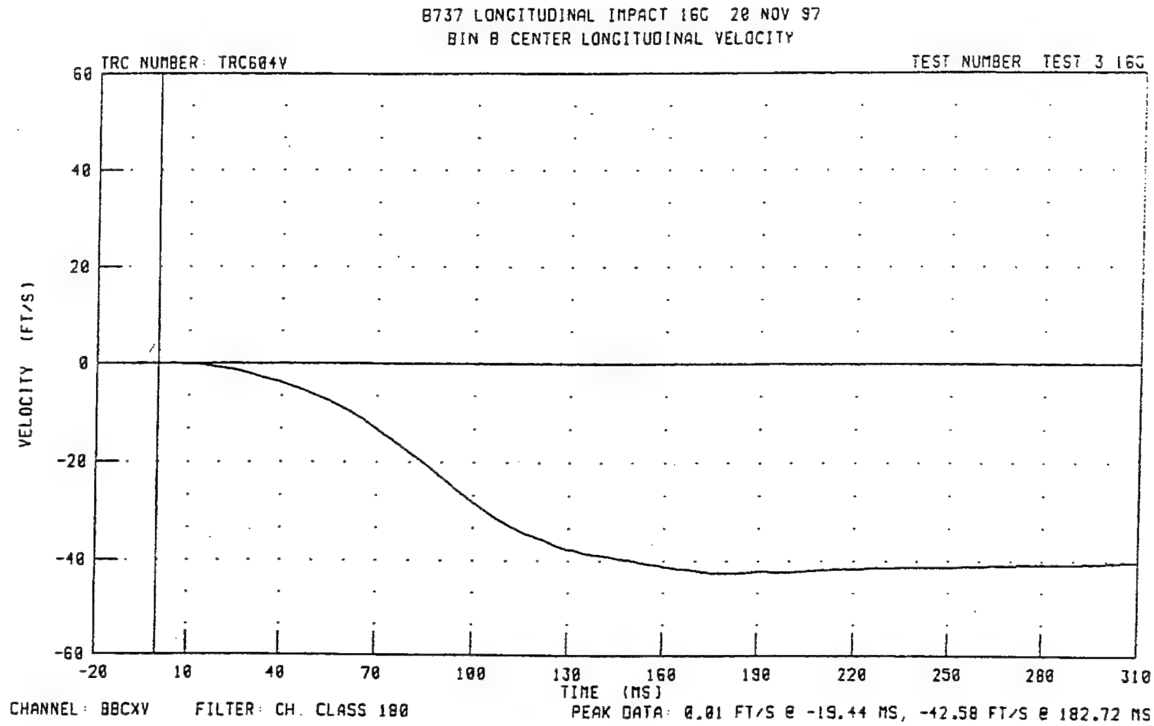
B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN B FRONT LONGITUDINAL VELOCITY
TRC NUMBER: TRC604V
TEST NUMBER TEST 3 16G
VELOCITY (FT/S)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BBFXV
FILTER: CH. CLASS 180
PEAK DATA: -0.02 FT/S @ -20.00 MS; -42.72 FT/S @ 182.80 MS

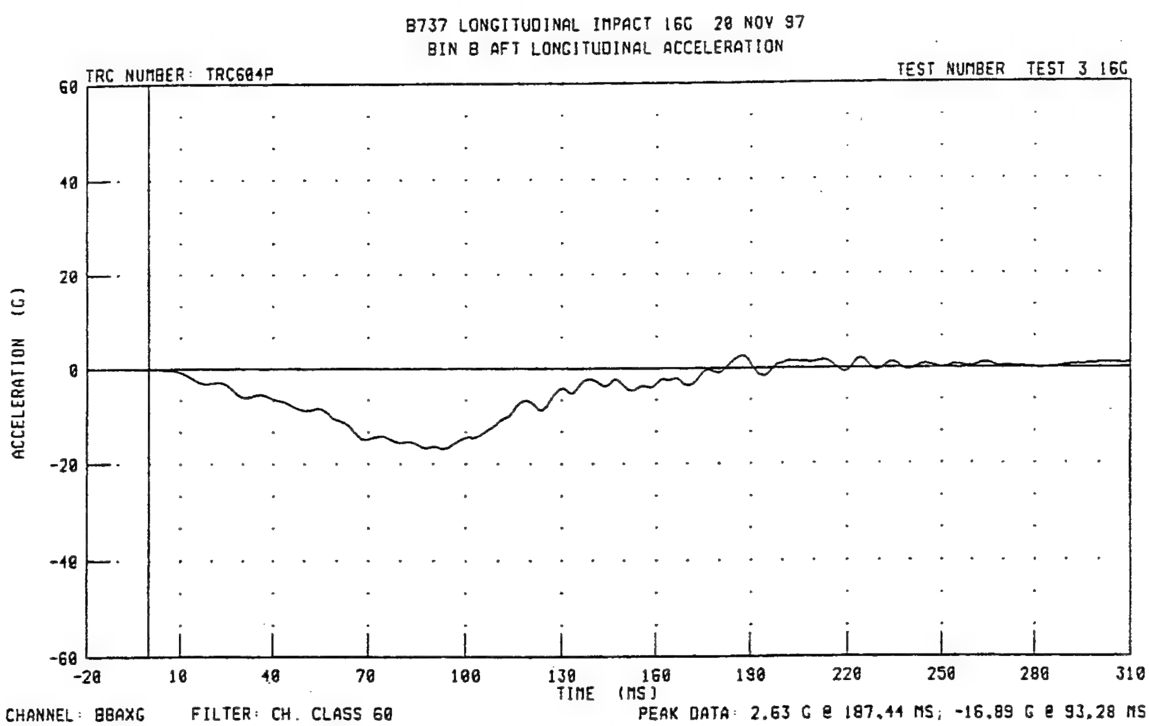


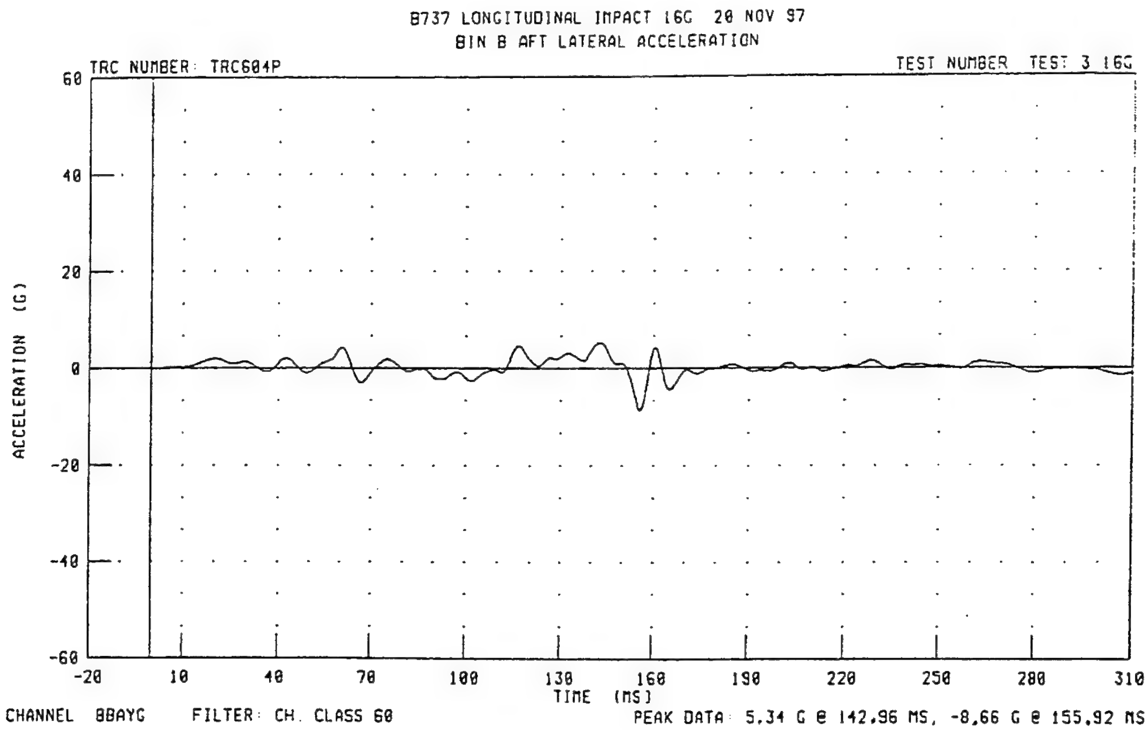
B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN B CENTER LONGITUDINAL ACCELERATION
TRC NUMBER: TRC604P
TEST NUMBER TEST 3 16G
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BBCXG
FILTER: CH. CLASS 60
PEAK DATA: 2.45 G @ 187.52 MS; -16.67 G @ 92.96 MS

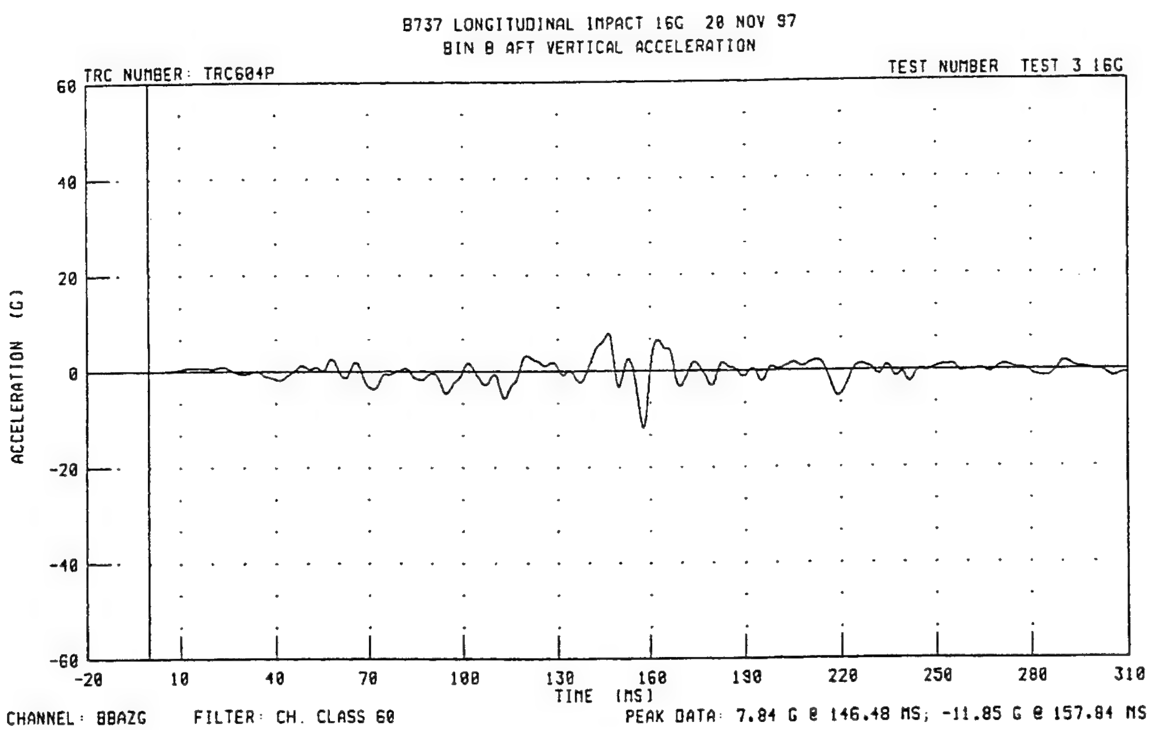

B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN B CENTER LATERAL ACCELERATION
TRC NUMBER: TRC604P
TEST NUMBER TEST 3 16G
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BBCYG
FILTER: CH. CLASS 60
PEAK DATA: 2.22 G @ 143.76 MS, -5.65 G @ 154.88 MS


B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN B CENTER VERTICAL ACCELERATION
TRC NUMBER: TRC604P
TEST NUMBER TEST 3 16G
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BBCZG
FILTER: CH. CLASS 60
PEAK DATA: 3.90 G @ 124.00 MS, -4.35 G @ 184.08 MS


B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN B CENTER LONGITUDINAL VELOCITY
TRC NUMBER: TRC604V
TEST NUMBER TEST 3 16G
60
40
20
0
-20
-40
-60
VELOCITY (FT/S)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BBCXV
FILTER: CH. CLASS 180
PEAK DATA: 0.01 FT/S @ -19.44 MS, -42.58 FT/S @ 182.72 MS


B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN B AFT LONGITUDINAL ACCELERATION
TRC NUMBER: TRC604P
TEST NUMBER TEST 3 16G
60
40
20
0
-20
-40
-60
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BBAXG
FILTER: CH. CLASS 60
PEAK DATA: 2.63 G @ 187.44 MS; -16.89 G @ 93.28 MS

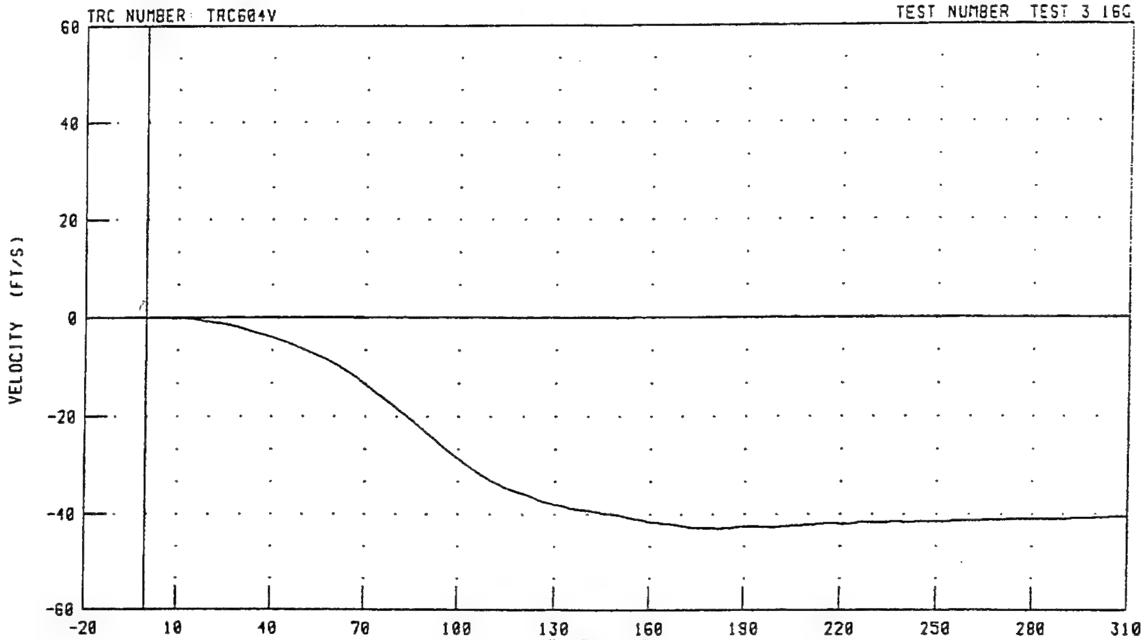

B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN B AFT LATERAL ACCELERATION
TRC NUMBER: TRC604P
TEST NUMBER TEST 3 16G
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL 8BAYG
FILTER: CH. CLASS 60
PEAK DATA: 5.34 G @ 142.96 MS, -8.66 G @ 155.92 MS


B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN B AFT VERTICAL ACCELERATION
TRC NUMBER: TRC604P
TEST NUMBER TEST 3 16G
ACCELERATION (G)
60
40
20
0
-20
-40
-60
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: 8BAZG
FILTER: CH. CLASS 60
PEAK DATA: 7.84 G @ 146.48 MS; -11.85 G @ 157.84 MS

B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN B AFT LONGITUDINAL VELOCITY

TRC NUMBER: TRC604V

TEST NUMBER TEST 3 16G

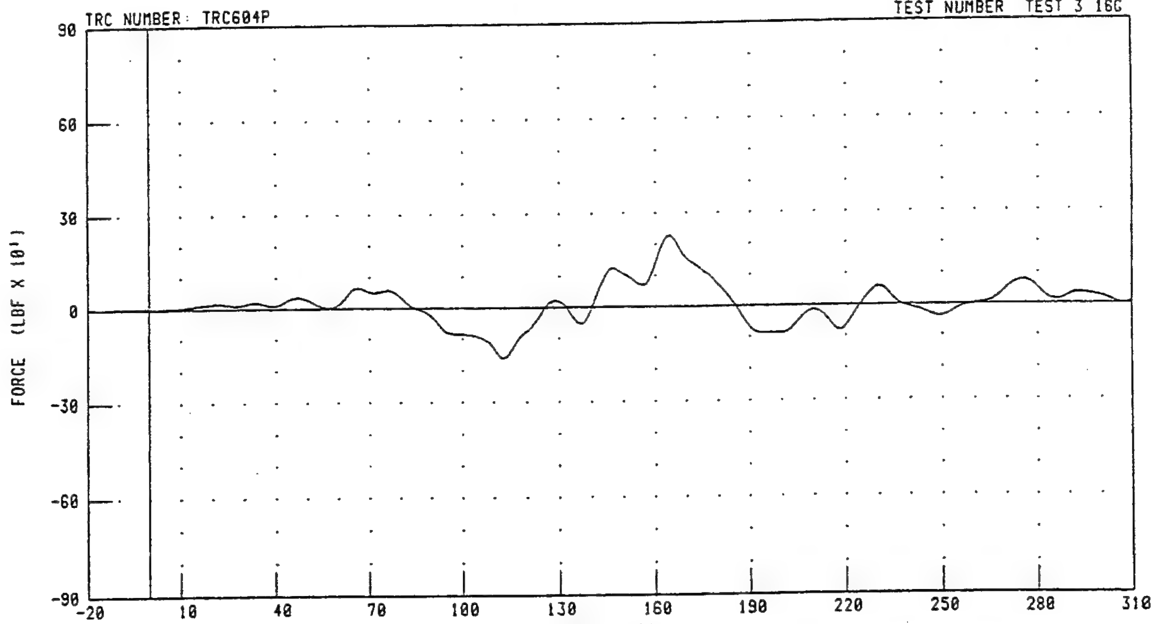


CHANNEL: BBAXV FILTER: CH. CLASS 180 PEAK DATA: 0.01 FT/S @ -13.68 MS; -42.94 FT/S @ 182.32 MS

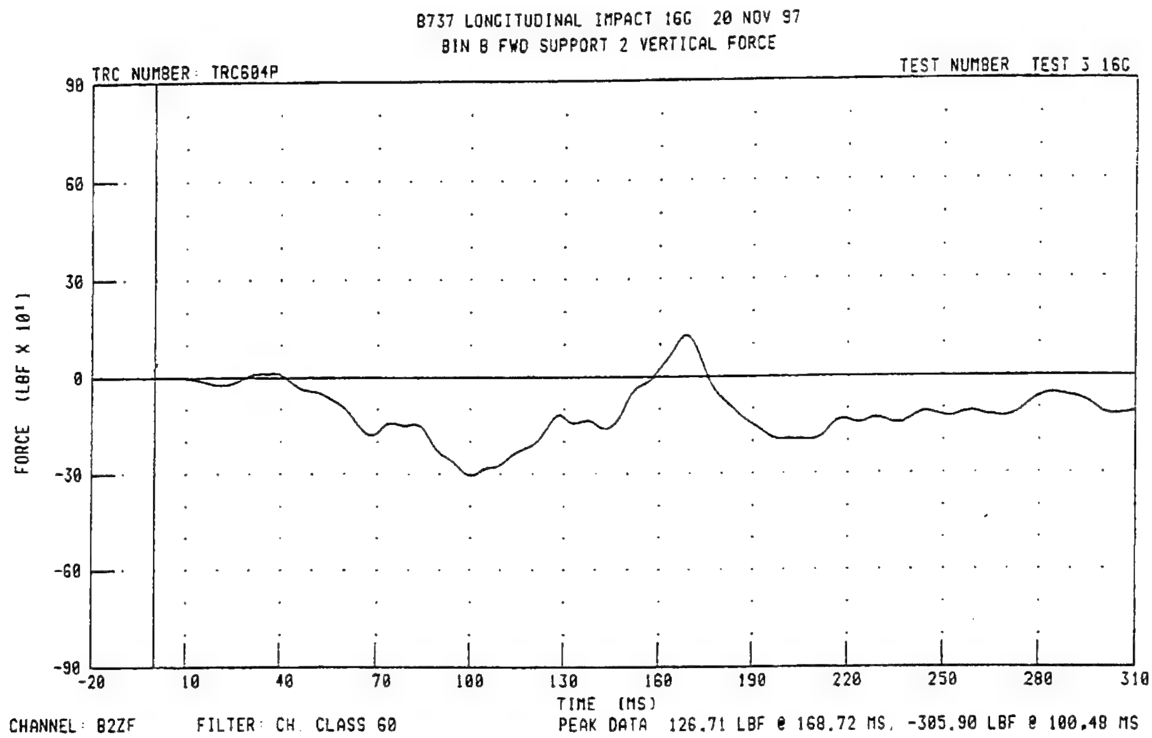
B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN B AFT SUPPORT 1 VERTICAL FORCE

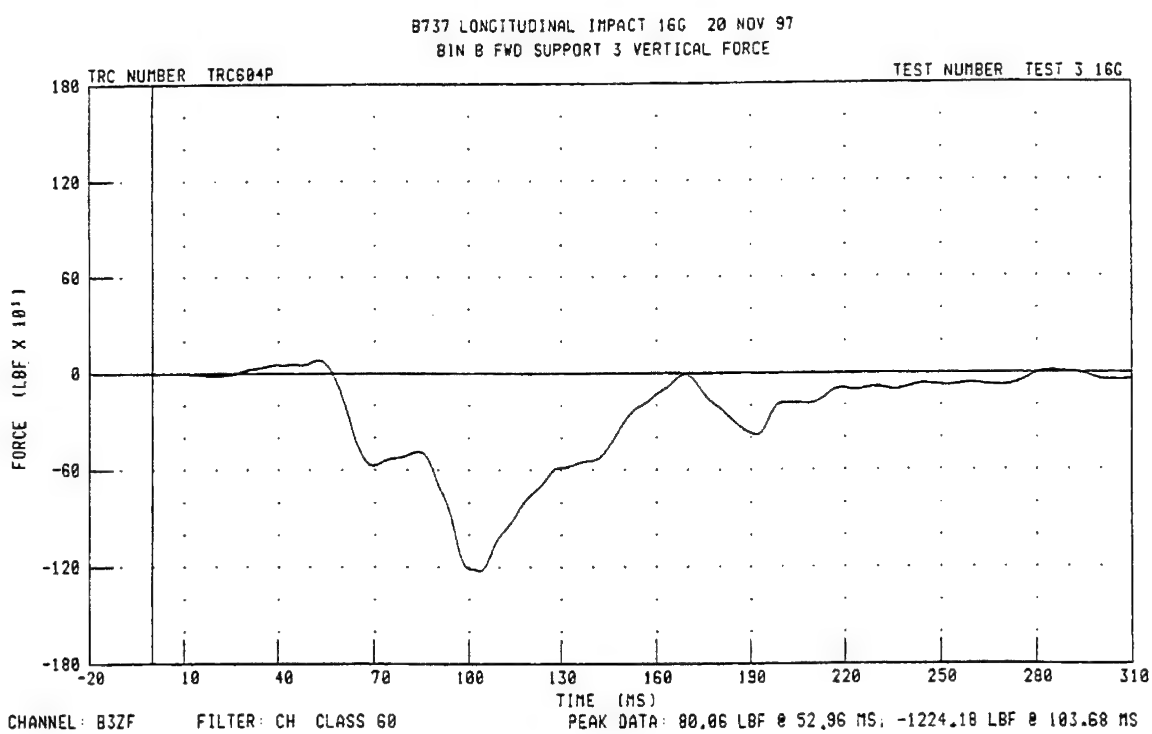
TRC NUMBER: TRC604P

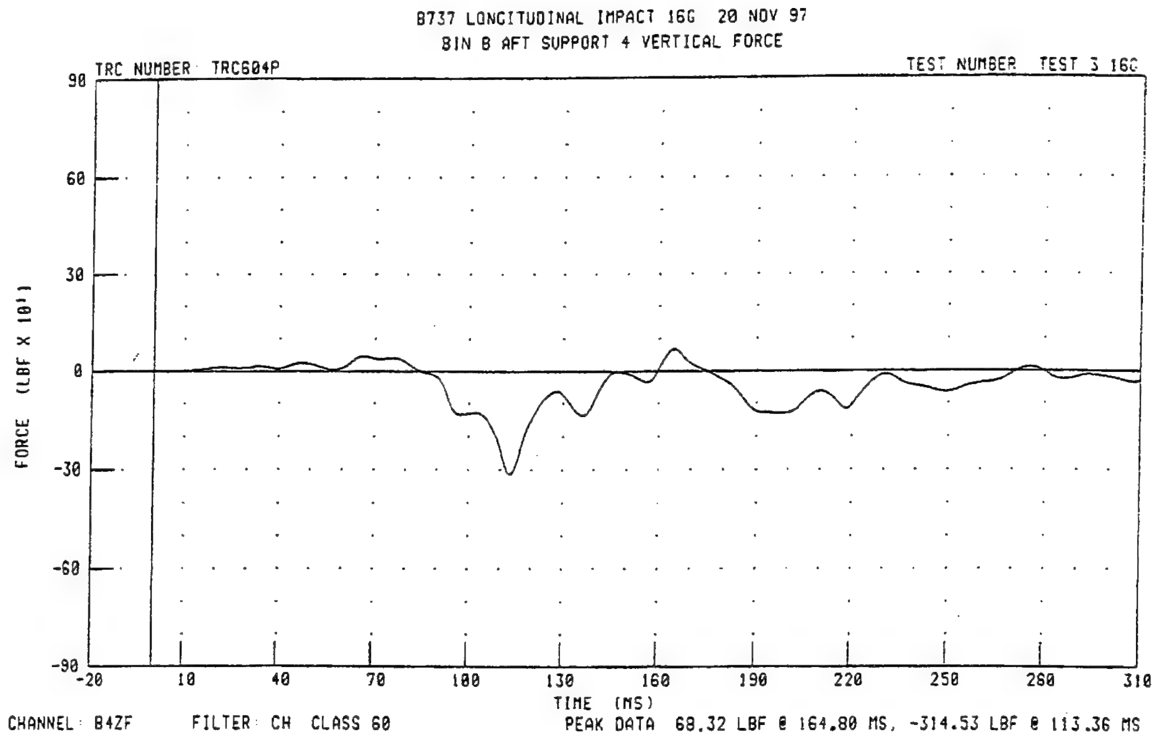
TEST NUMBER TEST 3 16G

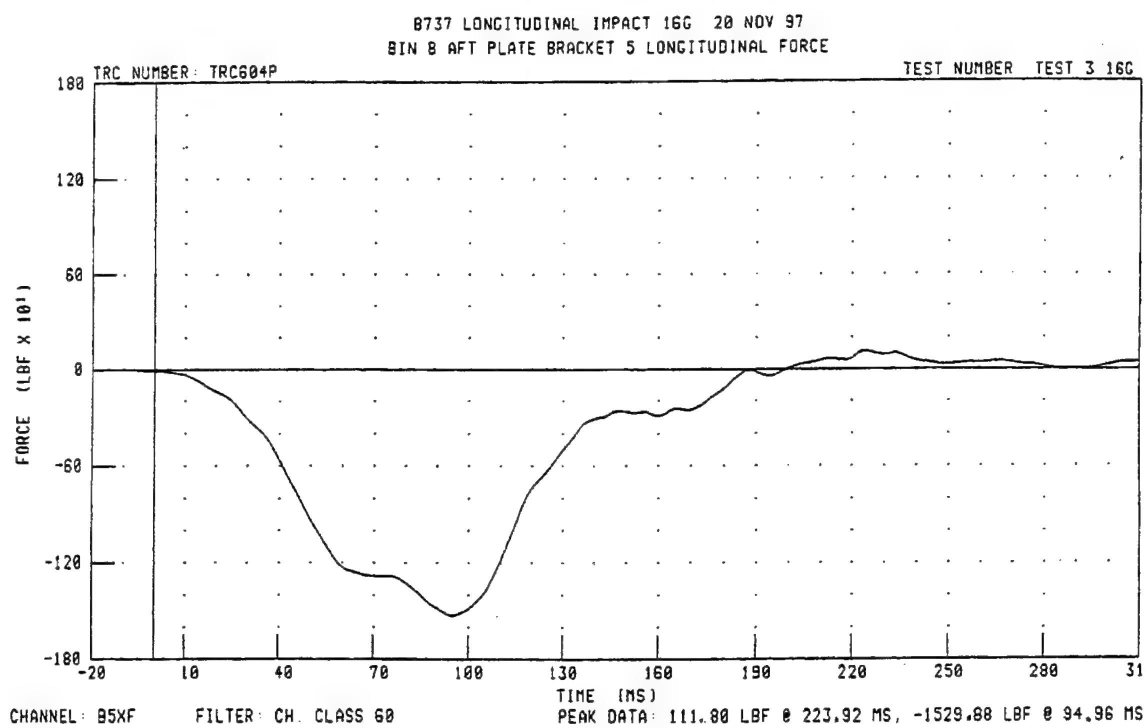


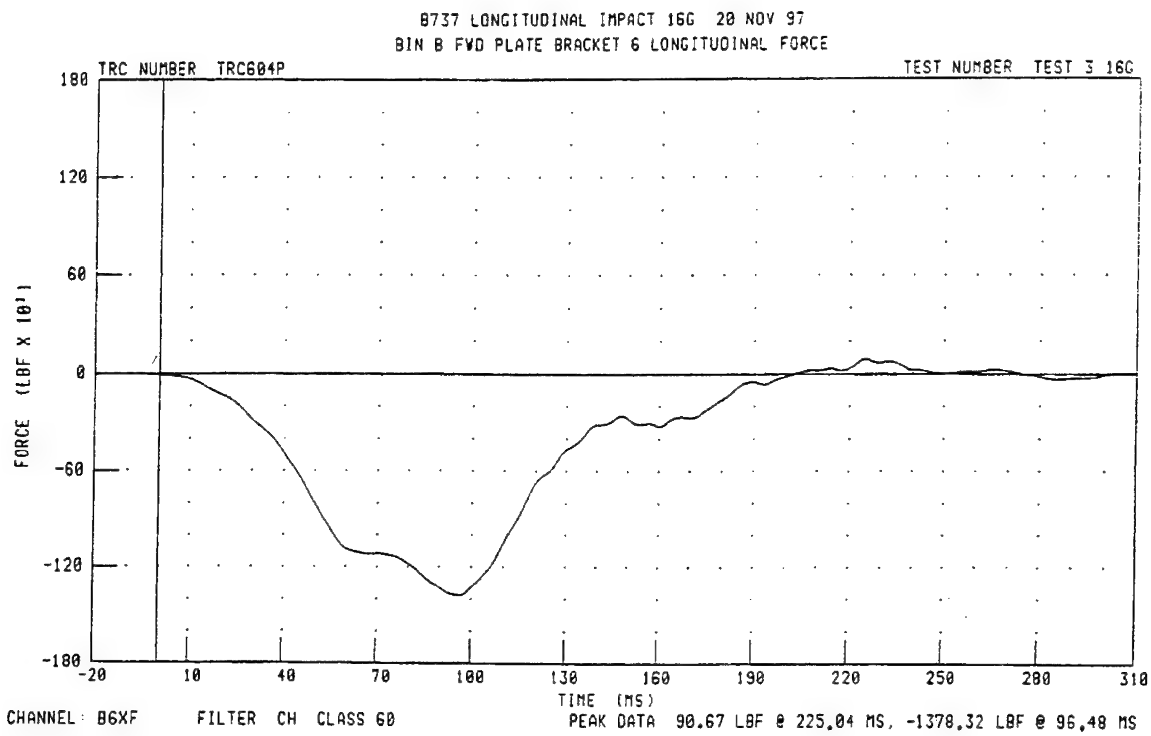
CHANNEL: B1ZF FILTER: CH. CLASS 60 PEAK DATA: 227.37 LBF @ 164.72 MS; -160.96 LBF @ 112.96 MS

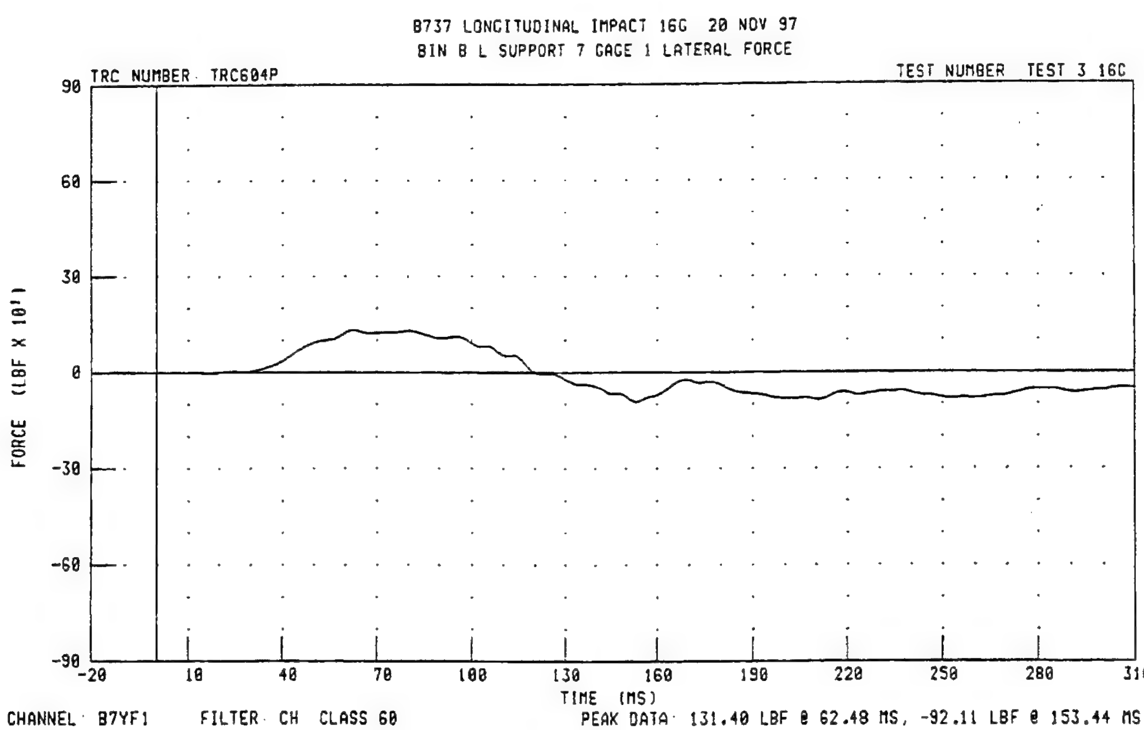

B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN B FWD SUPPORT 2 VERTICAL FORCE
TRC NUMBER: TRC604P
TEST NUMBER TEST 3 16G
FORCE (LBF X 10¹)
TIME (MS)
CHANNEL: B2ZF
FILTER: CH CLASS 60
PEAK DATA 126.71 LBF @ 168.72 MS, -305.90 LBF @ 100.48 MS

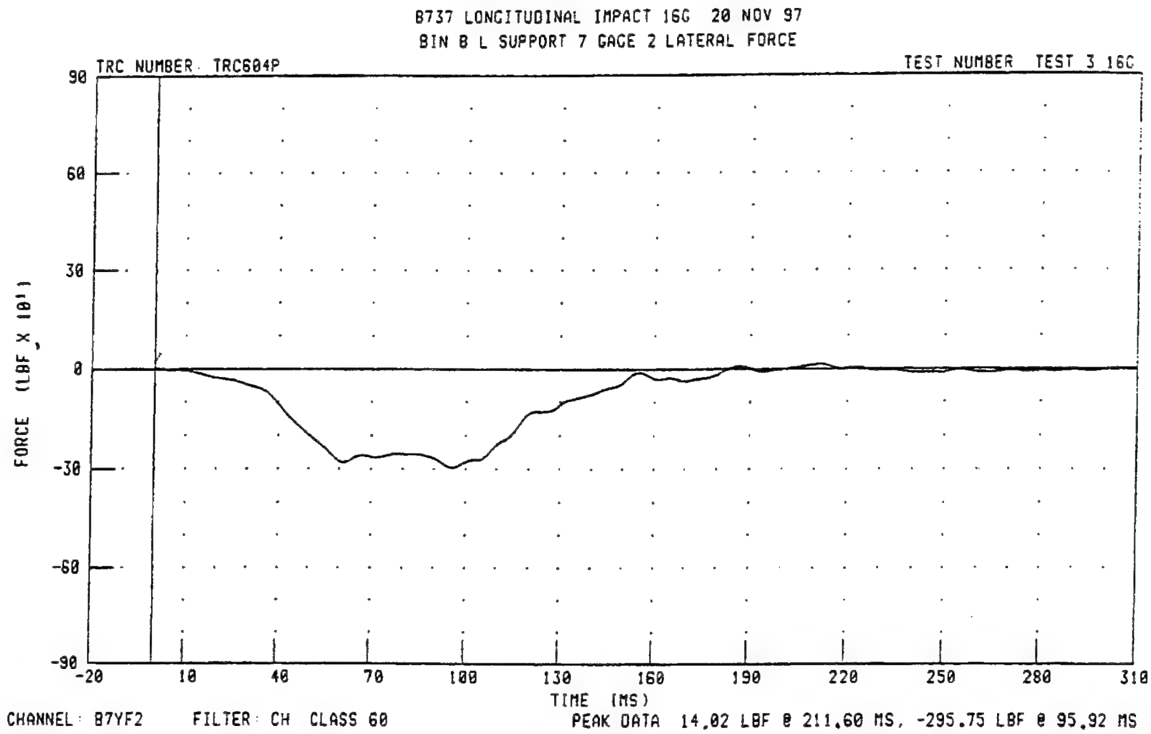

B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN B FWD SUPPORT 3 VERTICAL FORCE
TRC NUMBER TRC604P
TEST NUMBER TEST 3 16G
FORCE (LBF X 10¹)
TIME (MS)
CHANNEL: B3ZF
FILTER: CH CLASS 60
PEAK DATA: 80.06 LBF @ 52.96 MS, -1224.18 LBF @ 103.68 MS


B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN B AFT SUPPORT 4 VERTICAL FORCE
TRC NUMBER: TRC604P
TEST NUMBER TEST 3 16G
FORCE (LBF X 10¹)
90
60
30
0
-30
-60
-90
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: B4ZF
FILTER: CH CLASS 60
PEAK DATA 68.32 LBF @ 164.80 MS, -314.53 LBF @ 113.36 MS

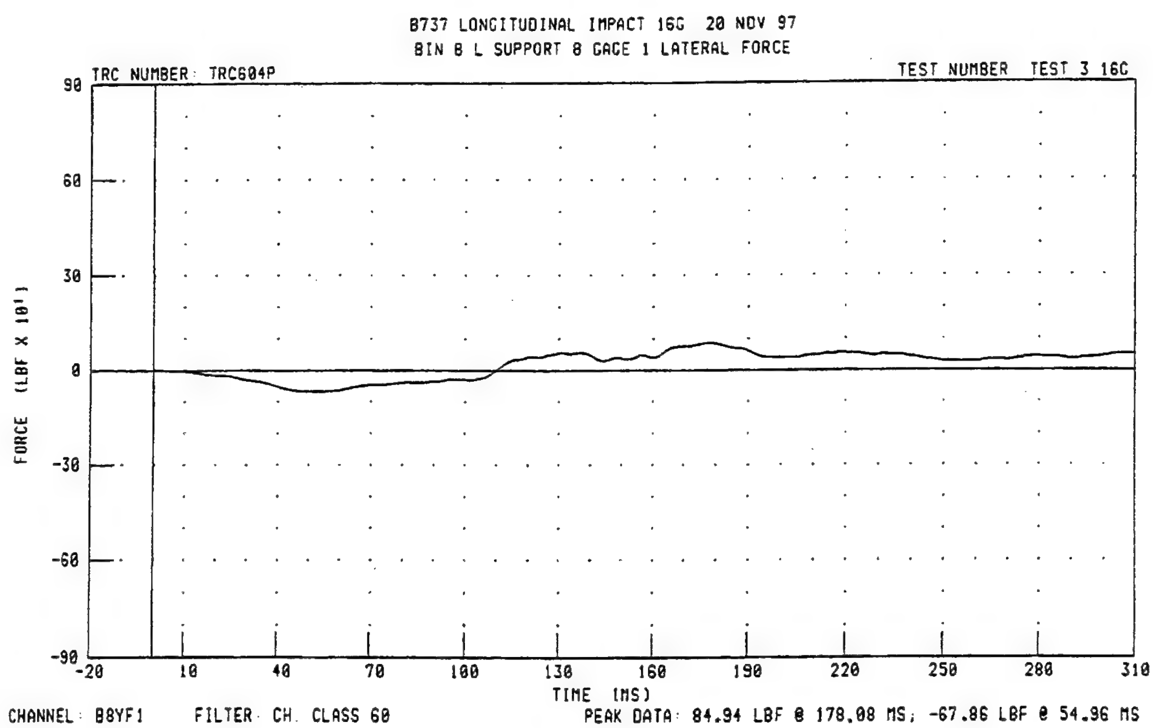

B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN B AFT PLATE BRACKET 5 LONGITUDINAL FORCE
TRC NUMBER: TRC604P
TEST NUMBER TEST 3 16G
FORCE (LBF X 10¹)
180
120
60
0
-60
-120
-180
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: B5XF
FILTER: CH. CLASS 60
PEAK DATA: 111.80 LBF @ 223.92 MS, -1529.88 LBF @ 94.96 MS


B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN B FWD PLATE BRACKET 6 LONGITUDINAL FORCE
TRC NUMBER TRC604P
TEST NUMBER TEST 3 16G
180
120
60
0
-60
-120
-180
FORCE (LBF X 10¹)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: B6XF
FILTER CH CLASS 60
PEAK DATA 90.67 LBF @ 225.04 MS, -1378.32 LBF @ 96.48 MS


B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN B L SUPPORT 7 GAGE 1 LATERAL FORCE
TRC NUMBER TRC604P
TEST NUMBER TEST 3 16G
90
60
30
0
-30
-60
-90
FORCE (LBF X 10¹)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: B7YF1
FILTER CH CLASS 60
PEAK DATA: 131.40 LBF @ 62.48 MS, -92.11 LBF @ 153.44 MS

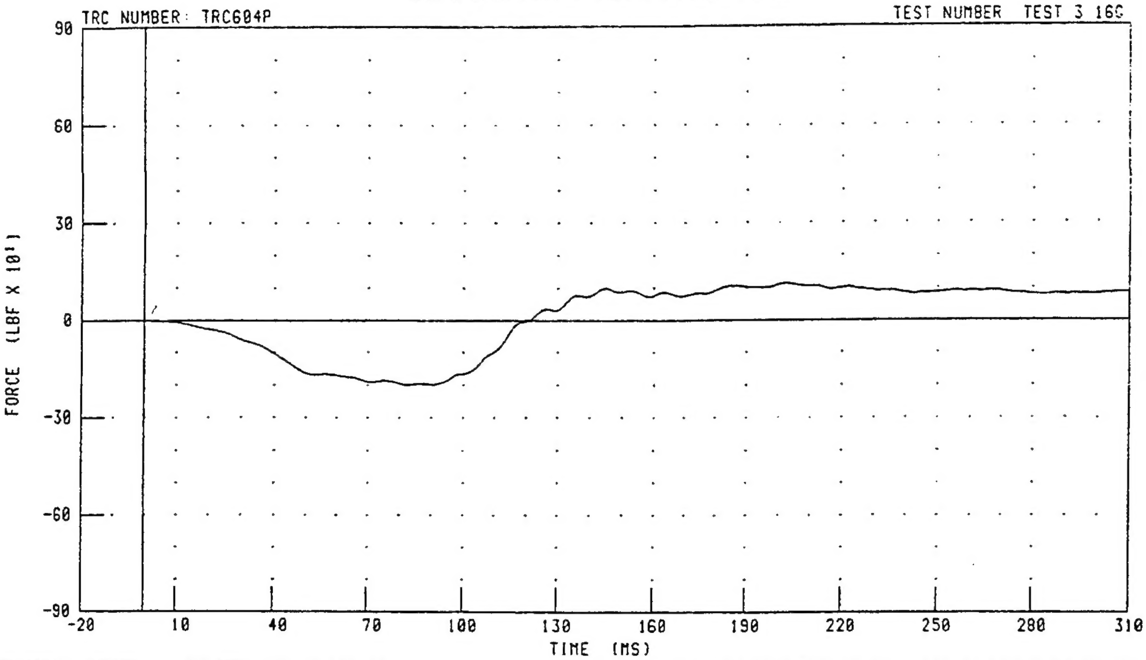


B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN B L SUPPORT 7 GAGE 2 LATERAL FORCE
TRC NUMBER: TRC604P
TEST NUMBER TEST 3 16G
FORCE (LBF X 10¹)
90
60
30
0
-30
-60
-90
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: B7YF2
FILTER: CH CLASS 60
PEAK DATA 14.02 LBF @ 211.60 MS, -295.75 LBF @ 95.92 MS



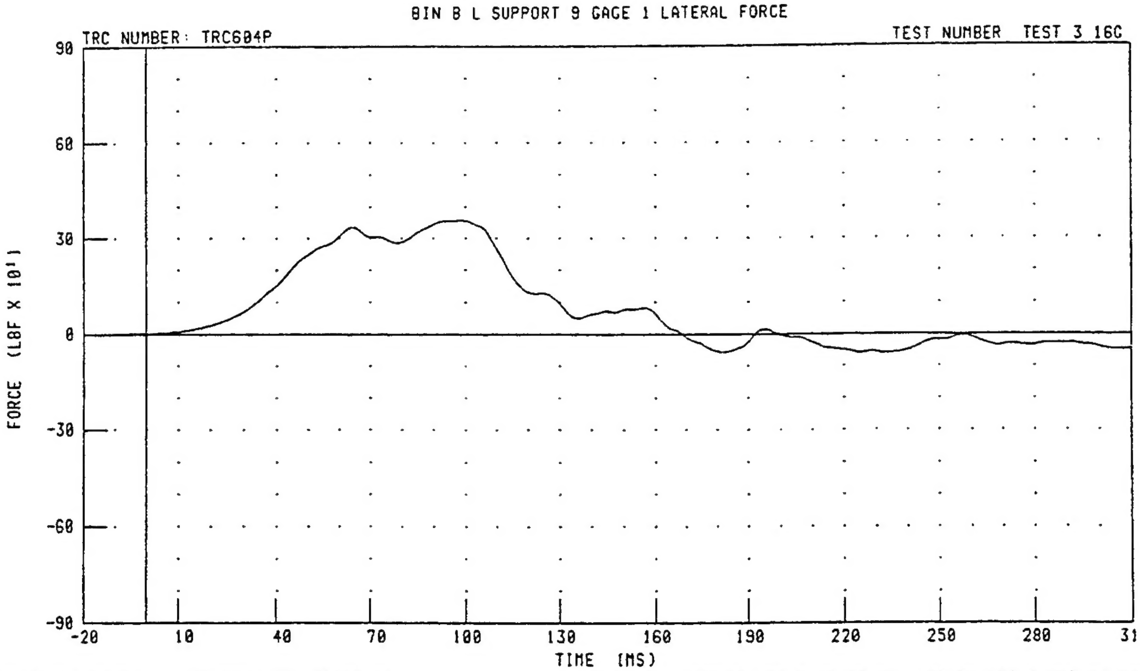
B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN B L SUPPORT 8 GAGE 1 LATERAL FORCE
TRC NUMBER: TRC604P
TEST NUMBER TEST 3 16G
FORCE (LBF X 10¹)
90
60
30
0
-30
-60
-90
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: B8YF1
FILTER: CH. CLASS 60
PEAK DATA: 84.94 LBF @ 178.08 MS; -67.86 LBF @ 54.96 MS

B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN B L SUPPORT 8 GAGE 2 LATERAL FORCE

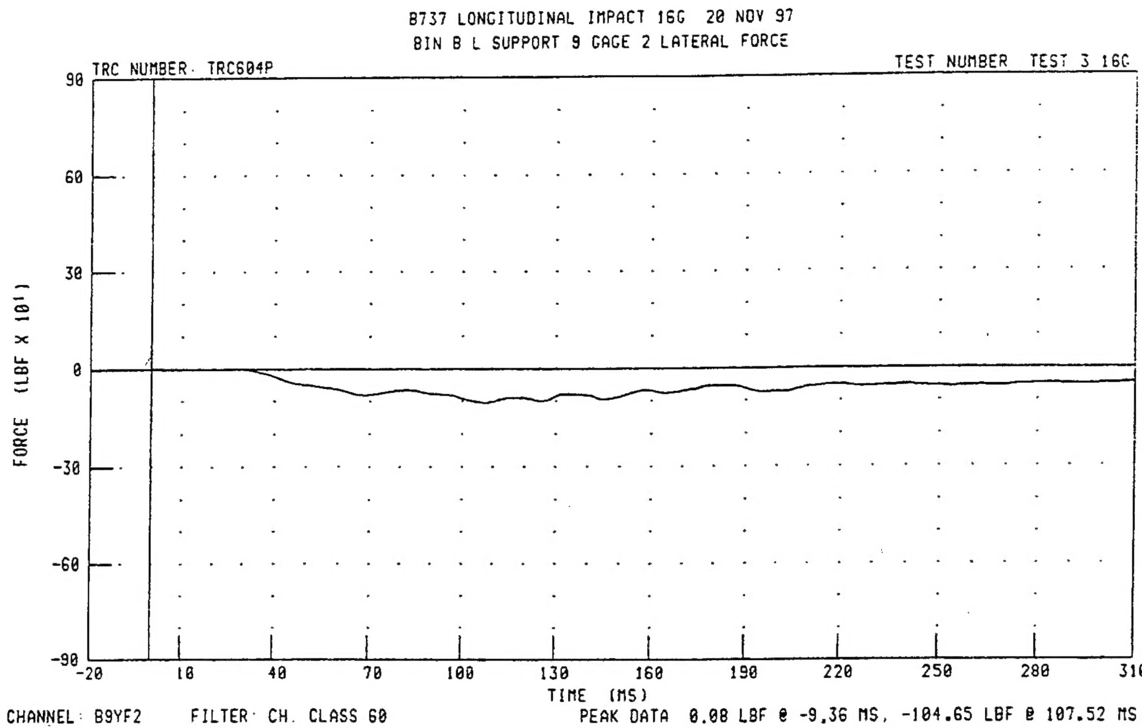


CHANNEL: B8YF2 FILTER CH. CLASS 60 PEAK DATA: 114.09 LBF @ 202.32 MS, -199.31 LBF @ 82.80 MS

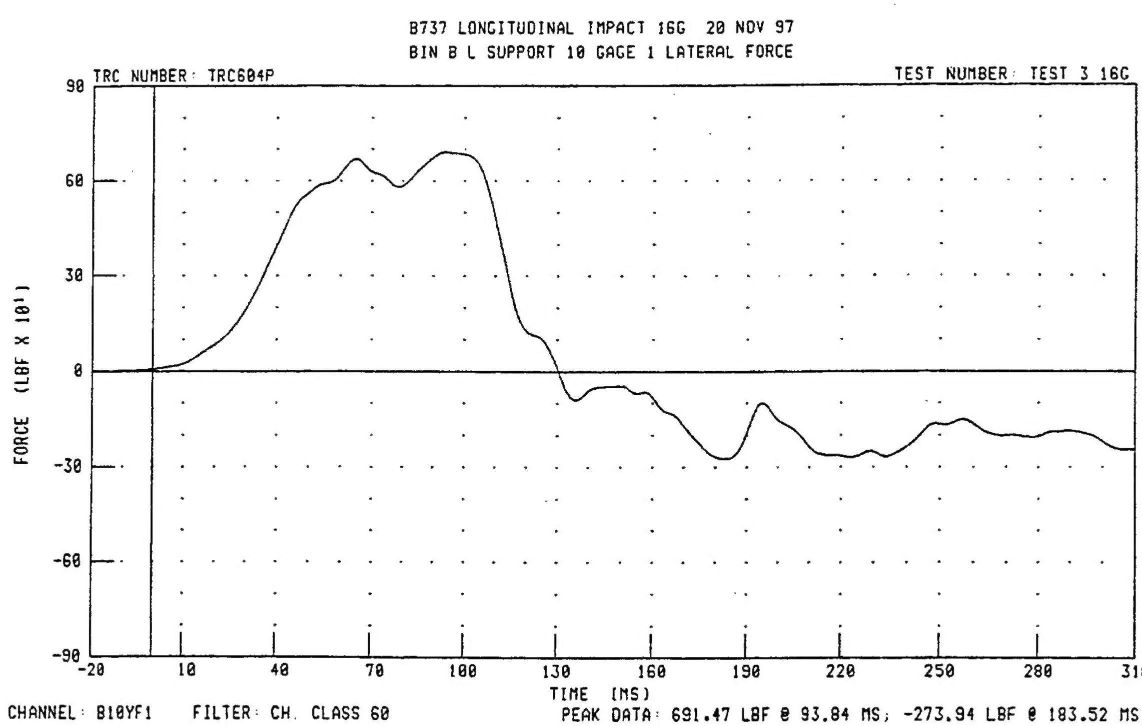
B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN B L SUPPORT 9 GAGE 1 LATERAL FORCE



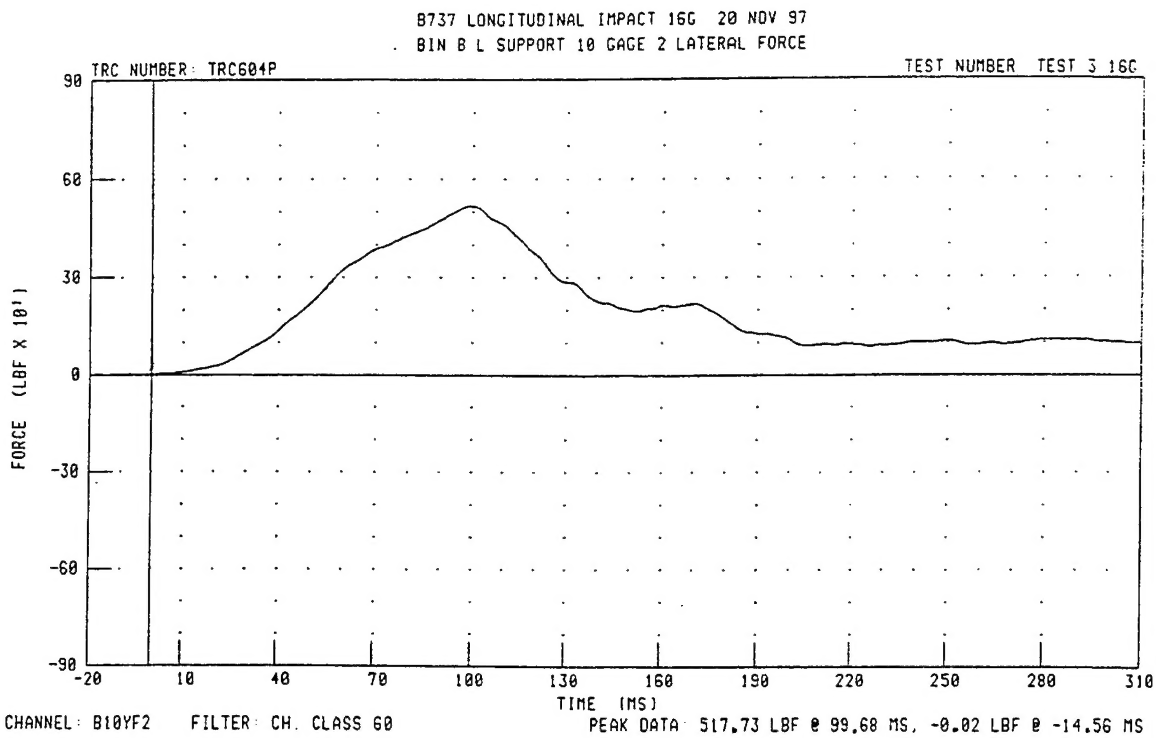
CHANNEL: B9YF1 FILTER: CH. CLASS 60 PEAK DATA: 356.27 LBF @ 98.32 MS; -60.78 LBF @ 233.04 MS



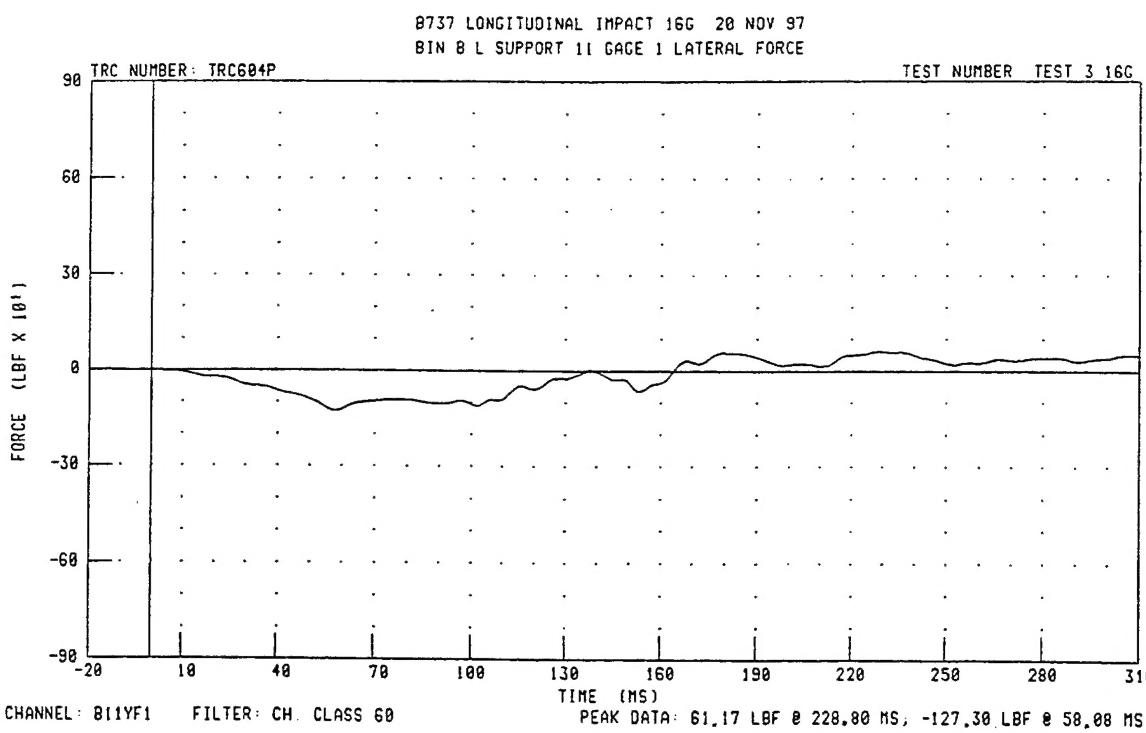
B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN B L SUPPORT 9 GAGE 2 LATERAL FORCE
TRC NUMBER: TRC604P
TEST NUMBER TEST 3 16G
90
60
30
0
-30
-60
-90
FORCE (LBF X 10¹)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: B9YF2
FILTER: CH. CLASS 60
PEAK DATA 0.08 LBF @ -9.36 MS, -104.65 LBF @ 107.52 MS



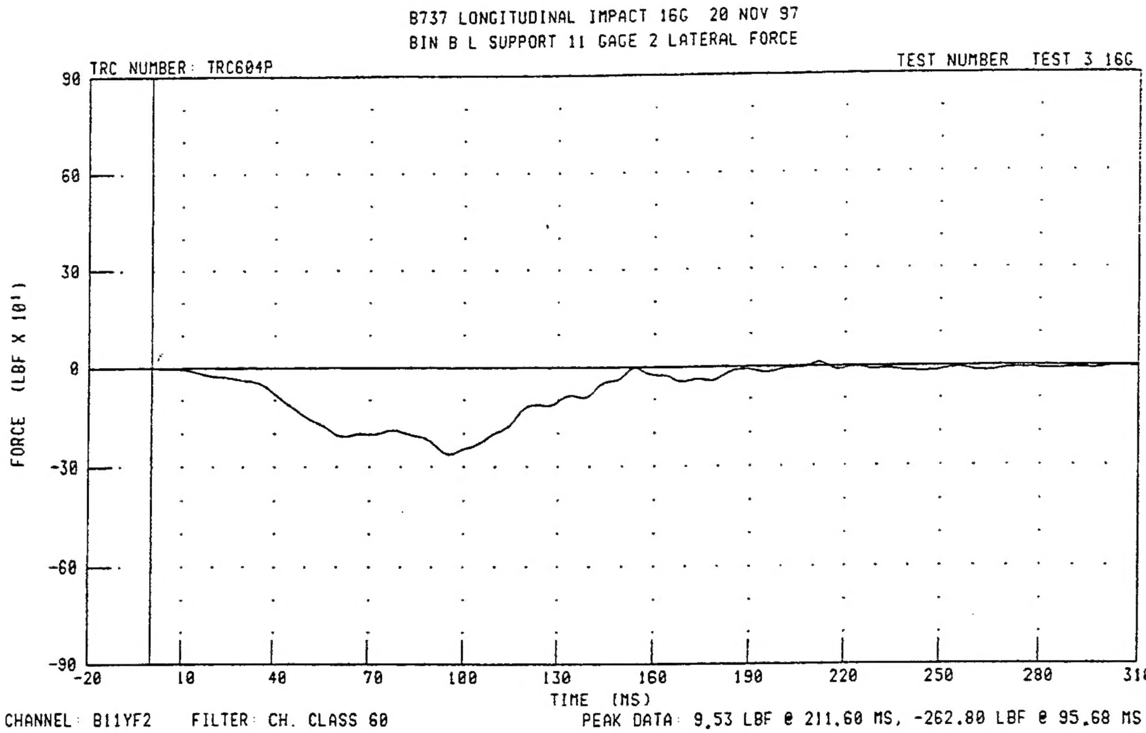
B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN B L SUPPORT 10 GAGE 1 LATERAL FORCE
TRC NUMBER: TRC604P
TEST NUMBER: TEST 3 16G
90
60
30
0
-30
-60
-90
FORCE (LBF X 10¹)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: B10YF1
FILTER: CH. CLASS 60
PEAK DATA: 691.47 LBF @ 93.84 MS; -273.94 LBF @ 183.52 MS



B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN B L SUPPORT 10 GAGE 2 LATERAL FORCE
TRC NUMBER: TRC604P
TEST NUMBER TEST 3 16G
FORCE (LBF X 10')
TIME (MS)
CHANNEL: B10YF2 FILTER: CH. CLASS 60
PEAK DATA: 517.73 LBF @ 99.68 MS, -0.02 LBF @ -14.56 MS



B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN B L SUPPORT 11 GAGE 1 LATERAL FORCE
TRC NUMBER: TRC604P
TEST NUMBER TEST 3 16G
FORCE (LBF X 10')
TIME (MS)
CHANNEL: B11YF1 FILTER: CH. CLASS 60
PEAK DATA: 61.17 LBF @ 228.80 MS, -127.30 LBF @ 58.08 MS



B737 LONGITUDINAL IMPACT 16G 20 NOV 97
BIN B L SUPPORT 11 GAGE 2 LATERAL FORCE
TRC NUMBER: TRC604P
TEST NUMBER TEST 3 16G
90
60
30
0
-30
-60
-90
FORCE (LBF X 10¹)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: B11YF2
FILTER: CH. CLASS 60
PEAK DATA: 9.53 LBF @ 211.60 MS, -262.80 LBF @ 95.68 MS